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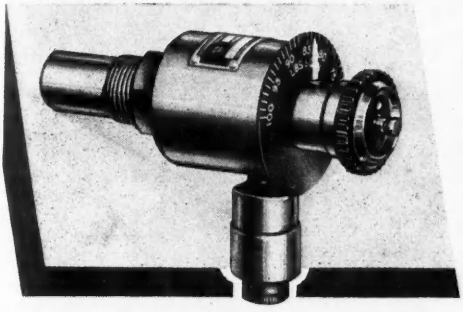

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER

ESTABLISHED 1872

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Turbine Maintenance

PROBLEMS RAISED BY LOWERED FREQUENCY

TO the abnormally mild weather experienced so far this winter must be attributed the relief recently enjoyed from load shedding on the serious scale of the previous two seasons. In 1947 supply was curtailed 122 times, sometimes to the extent of a fifth of the total load. No part in the improvement can be attributed to the installation of new generating plant, since the net addition during the past year was only 327,000 kW. In the meantime kWh output increased by 8 per cent. Had the demand risen correspondingly, nearly 900,000 kW of new plant would be necessary now to attain to even the thoroughly unsatisfactory standard of 1947.

An Undesirable Expedient

In reality the position is worse than these figures indicate. More than 400,000 kW above the demand that would otherwise entail load shedding can be carried by what appears to be the simple expedient of dropping the system frequency below 50 c/s, often for hours at a stretch. Of this the general public knows little beyond that electric clocks are not now so accurate as of yore. In industry, however, the output of rotating machinery may be lessened by the square or the cube of the difference in speed of the driving motor, adversely affecting production. Such factors are not revealed in mass statistics which, by including resistive loads, indicate a relationship between frequency and load that is roughly in direct proportion.

There is another and probably equally serious aspect of operation at sub-normal frequency. The low limit of 48 c/s was originally set to ensure the proper functioning of certain station auxiliaries without which total plant shut-downs might be widespread and lengthy. In the experience of many operation engineers, which was expressed freely during the discussion of Mr. F. D. Roberts' lecture to the London Technical Group of the Electrical Power Engineers' Association (reported on page 94), running at sub-normal frequencies is creating serious maintenance problems. This is a contributory factor to the magnitude of plant out of commission during winter peaks of the order of 16 per cent, compared with a pre-war average of 6 per cent. During and immediately after the war turbine blading troubles were ascribed to inadequacy of maintenance staffs, but this, it is now apparent, does not provide the full explanation.

Critical Speeds

Turbine rotors have to be so designed that the natural frequency of vibration of the moving parts shall not be a multiple of the system frequency. With modern turbo-alternators having flexible couplings, the critical speeds occur below full speed and it requires skill in a driver on starting up to bring a set through the danger zone without trouble, but different conditions prevail when speeds are forced down below the nominal r.p.m. The contention is that the present margin allowed to frequency drop due to over-

loading is too great to avoid critical speeds, a contention that can be checked readily by the use of vibration indicators; the old rule-of-thumb methods do not provide early enough warning of possibly impending trouble, having regard to the large masses of metal in large units. Practical considerations of this kind demonstrate that the effects of plant shortage cannot be determined by slide-rule methods. They also support the reasons advanced in our leading article of 24th December that the whole subject calls for urgent Government action to reinforce the efforts being made by the electrical industry to provide new generating capacity with all possible speed.

AMENITIES AND PUBLIC

ANXIETY that "amenities" shall not be interfered with is a factor which causes much delay in the execution of electrification schemes. It occasionally happens that the desire to preserve amenities does not square with the desires of the inhabitants of a district. Recently the North of Scotland Hydro-Electric Board decided against using the river Grimersta, in Lewis, for generating electricity as it was thought the proposal would meet with intense opposition. But the secretary of the Lewis Association informs the *Glasgow Herald* that if a plebiscite of the 25,000 people of the island were taken not a dozen votes would be cast against the scheme. He wants to know where the opposition would be likely to come from.

CONVERSION METHODS

A NEW approach towards the solution of the problem of a.c./d.c. and d.c./a.c. conversion in connection with d.c. transmission seems to me to be implicit in some remarks of Professor A. Tustin during the Birmingham discussion of the I.E.E. paper by Mr. F. J. Erroll and Lord Forrester. We have in mind Professor Tustin's reference to the possibility of building high-efficiency electrostatic machines, either as generators or motors, of a size for a given output that would be comparable with the size of electro-magnetic machines. He tells us that further information on the subject has been given in articles by N. J. Felici entitled "Machines Electrostatique Puissantes," which appeared in *Le Journal de Physique et le Radium* (Serie 8, Tome 8 and 9) in January, 1947, and February, 1948 (No. 2).

ELECTRICAL ADVANCE CONTINUES

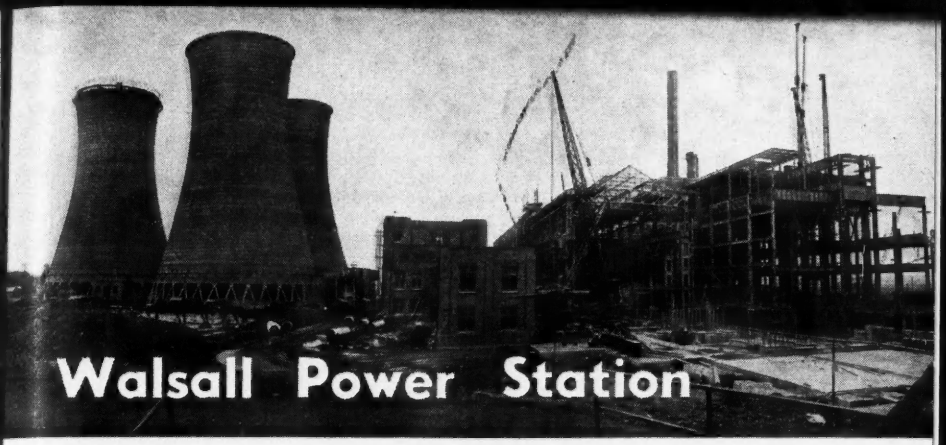
THE latest figures published by the Ministry of Fuel and Power show that electricity output increased last year by over 9 per cent. This was achieved with an installed plant capacity, at the end of the year, only 3.9 per cent greater than in 1947. Records for the past twenty years reveal a more than four-fold expansion in electricity generated, from 10,294 million kWh in 1929 to 46,535 million last year, and in only one year—at the immediate end of the war—was there a break in the annual rise in output.

TEMPTING SALARIES

IT is stated by the *Daily Telegraph* that local authorities are perturbed at the rate at which people are leaving their service to join nationalized industries. Particular mention is made of the electricity supply industry; it is alleged that enormous increases in salary are being secured by men who are changing over from local councils to Electricity Boards. It appears as though local government officers are not overpaid, and that the cream of them are being remunerated by their new employers at the rates more in relation to their ability. On the other hand, it may be this which has given rise to some dissatisfaction among the technical staffs of the new authorities; most of the newcomers are on the administrative side.

TENDERING PERIODS

THERE have been complaints by members of the Electrical Contractors' Association about the short space of time allowed to them in which to submit tenders. One has mentioned a contract with a 22-page specification for which only five days, including a week-end, was allowed. This is a long-standing grievance and one which could easily be remedied. Few jobs of any size have to be done in a hurry. If the authorities calling for tenders would advertise a little earlier they would help contractors and at the same time get sounder estimates and fewer "extras."



Walsall Power Station

CONSTRUCTIONAL FEATURES

ANOTHER power station under construction in this country which has now reached a stage in its development suitable for us to present our preliminary "constructional" description is that at Walsall of the Midlands Division of the British Electricity Authority, and we are indebted to Mr. F. W. Lawton, Divisional Controller, for permission to visit the station and to publish this article.

Work was started on the site about two years ago and there are now about 750 men employed on the station, including builders and plant erectors. It is a "straight" station, in line with general practice, with stoker firing and tower condenser water cooling. The station is to have a total capacity of 180 MW in six sets served by twelve 150,000 lb per hour normal rating boilers.

The steel framework of the main buildings is about three-quarters completed, while the brick walls and roofs are about half finished; one of the two groups of three cooling towers in each group is practically completed. The cooling towers (Mitchell Construction Co., Ltd.) are of reinforced concrete construction and they rise 240 feet above ground level to about 700ft o.d. In each case the bottom, waist and top diameters are 165ft, 89ft and 100ft respectively. The accompanying aerial view was taken in July last, so that it does not quite represent the present state of development.

The station is situated on the northern outskirts of Walsall, and the site is bounded on the north by the Derby-Wolverhampton Railway, Derby being about 30 miles to the north-east and Wolverhampton 7 miles to the west. Immediately to the south-west of the site is Reeds Wood Park, and at the south end of the site is the Wyrley and Essington Canal. Adjacent to this canal on the west side is the existing Walsall (Birchills) power station which has a plant capacity of 17.5 MW. Birchills is at the east end of the site and the main buildings of the new station are developing eastwards towards the existing station which will be only 40ft or so from the east end of the new station.

The site has an area of between 60 and 70 acres. It is roughly rectangular in shape, its east-to-west length being about 2,500ft. The main buildings, which run longitudinally almost due west to east, are at the east end of the site where there is a southerly projection to accommodate the cooling towers. Here the site width, north to south, excluding the approach road, is a little over 1,000ft. At the west end of the site is the coal storage area which will accommodate about 135,000 tons at a depth of 20 feet. At the N.E. corner of this area, i.e., off the N.W. corner of the main buildings, there are being erected two wagon tipplers for the coal-handling plant and elevated hoppers for the ash-handling plant. There will be an extensive system of sidings at the north of the site alongside the main line.

The general level of the area around the site is about 462ft o.d., and the railway sidings are at about 445ft. The approach road to the site runs practically due south to north along the east side of the park and between the two groups

of cooling towers. The boiler house to the north and the turbine house to the south, with an intermediate auxiliaries-switchgear annexe and auxiliary bay, are side by side as one covered area. The switch house and office block to the south is an entirely separate building running parallel with, and at about 30ft from, the main buildings. Outside the site area on the other side of the railway and off the N.W. corner of the main buildings a grid substation is being constructed. Projecting into the site from the canal at the N.E. corner is a basin for coaling barges.

Extensive Site Work

A considerable amount of site levelling has had to be carried out and this work is still going on at the east end. A part of the area was initially built on and the buildings have been razed, suitable material obtained from this work being used for making up the coal-storage ground. Apart from this the site is largely on made-up ground, and parts of the area are over clay and coal strata. Some of it is actually over surface coal workings; indeed, about 30ft down the boiler house of an old disused colliery was found and one of the cooling towers had to be provided with piled foundations. Some of the make-up material under what is now the west end of the main buildings had to be removed to a depth of 29ft and replaced by mass concrete.

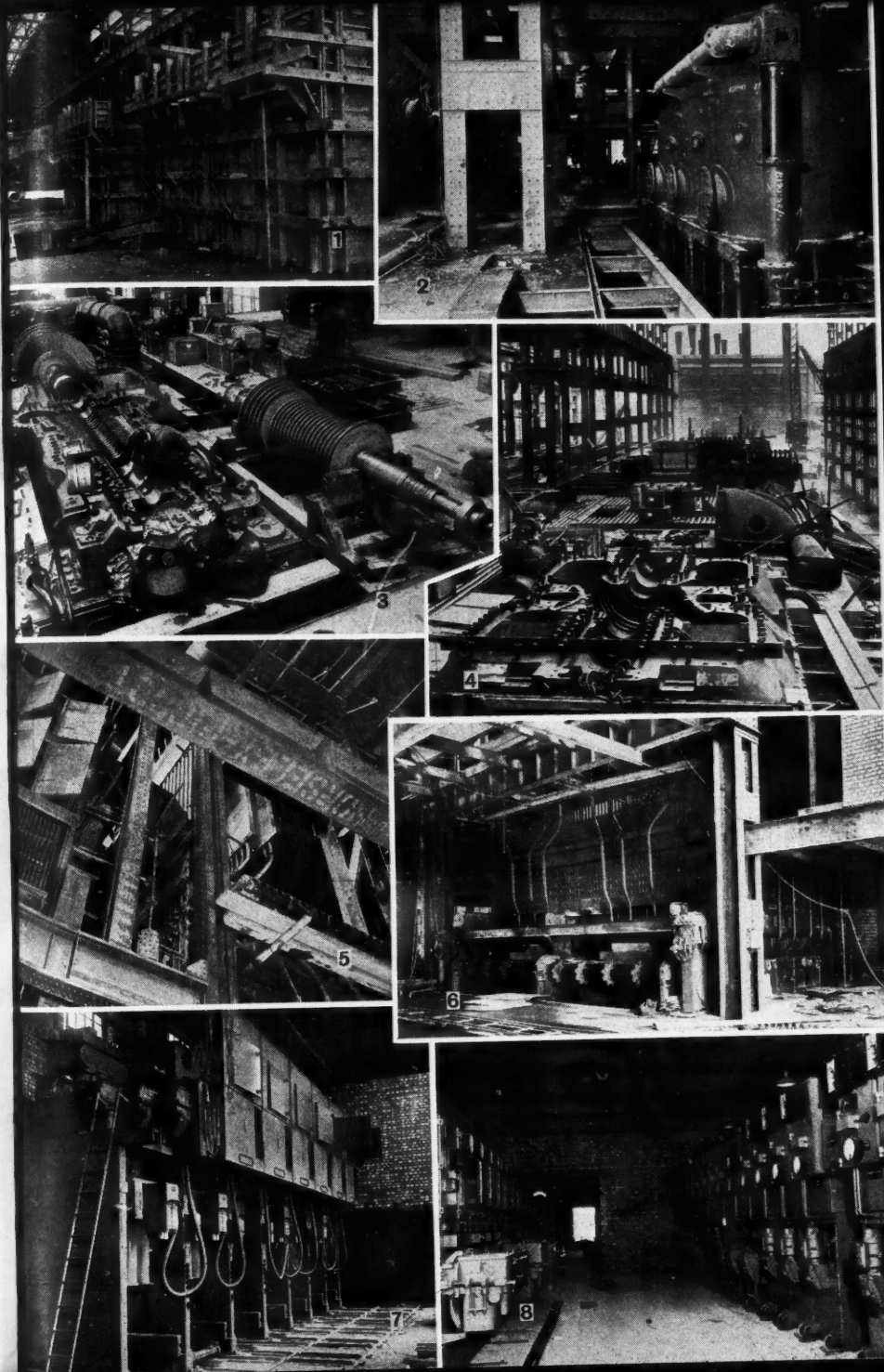
The main buildings are of steel stiff frame and portal construction with encased brick filling, and the main overall dimensions, excluding the switch house, are 650ft and 230ft. The boiler house has a complete raft foundation varying from 5ft to 8ft thick, below which make-up of certain materials had to be replaced as described. The turbine-house foundations are on strip footings, with isolated foundations to the turbo-alternators and the other plant disposed on the floor slab. The switch house and office block is about 425ft long and 62ft wide overall, and it is of steel frame construction, with brick walls and concrete floors and roof. The general layout of the main buildings components, all in parallel lines running west to east, is in the following order from north to south: The boiler house, auxiliaries-switchgear annexe, feed-heater bay, main turbine bay and, finally, suspended roadway with the office block in front.

The turbine house is the longest component of the main buildings (650ft). It is about 100ft wide, including the feed-heater bay, which is 25ft wide on the north side. The six 30 MW B.T.H. turbo-alternators are aligned end-on, with facing steam ends, down the central portion of the turbine house. The clear spaces between the sets are about 25ft, except the central one, which is about 50ft.

The general level of the ground floor is 462ft, while the turbine platform and operating floor level is 480ft. The house rises to a top roof level of about 530ft, and the overhead main house crane has a rail level of 34ft above the operating floor. The concrete machine blocks for the six sets are in different stages of construction. The first two sets are completed, Nos. 3 and 4 are completed up to steel-platform level, and Nos. 5 and 6 are just beginning to rise above the foundation mat level. We saw No. 1 set quite ready for the reception of the high pressure steam rotor, the low pressure rotor being already in position. At that time the bottom half of the No. 2 set was being levelled. Each turbine has 22 high pressure stages and 14 low pressure stages, i.e., seven on each side of the double-flow low pressure cylinder. The sets run at 3,000 r.p.m. and the steam conditions are 600lb per sq. in. and 850 deg F. Each set has Hick Hargreaves twin condensers on springs on concrete plinths, and the development here is in line with that of the turbo-alternators, the condensers for Nos. 1 and 2 sets being complete.

The Drysdale circulating-water pumps

See opposite page.—Turbo-alternator foundation blocks are in various stages of development from the first to the completed ones at the (west) far end. (2) Evaporators (right) rise from the basement level through the turbine room general floor; feed heaters (centre) and condenser on plinths (left). (3) Bottom half of No. 1 turbine ready to receive its h.p. steam rotor (right). (4) Development is eastwards towards the existing Birchills power station. (5) Looking up at the side of No. 1 boiler: (left) economizers; (centre) inclined tube headers; and (right) superheater bank. (6) No. 1 boiler is in an advanced stage; combustion chamber front and side tubes and chain grate stoker rockers. (7) 500 MVA main 33 kV switchgear is well forward. (8) On third floor of the auxiliaries-switchgear annexe 400 V and 3.3 kV switchgear is well advanced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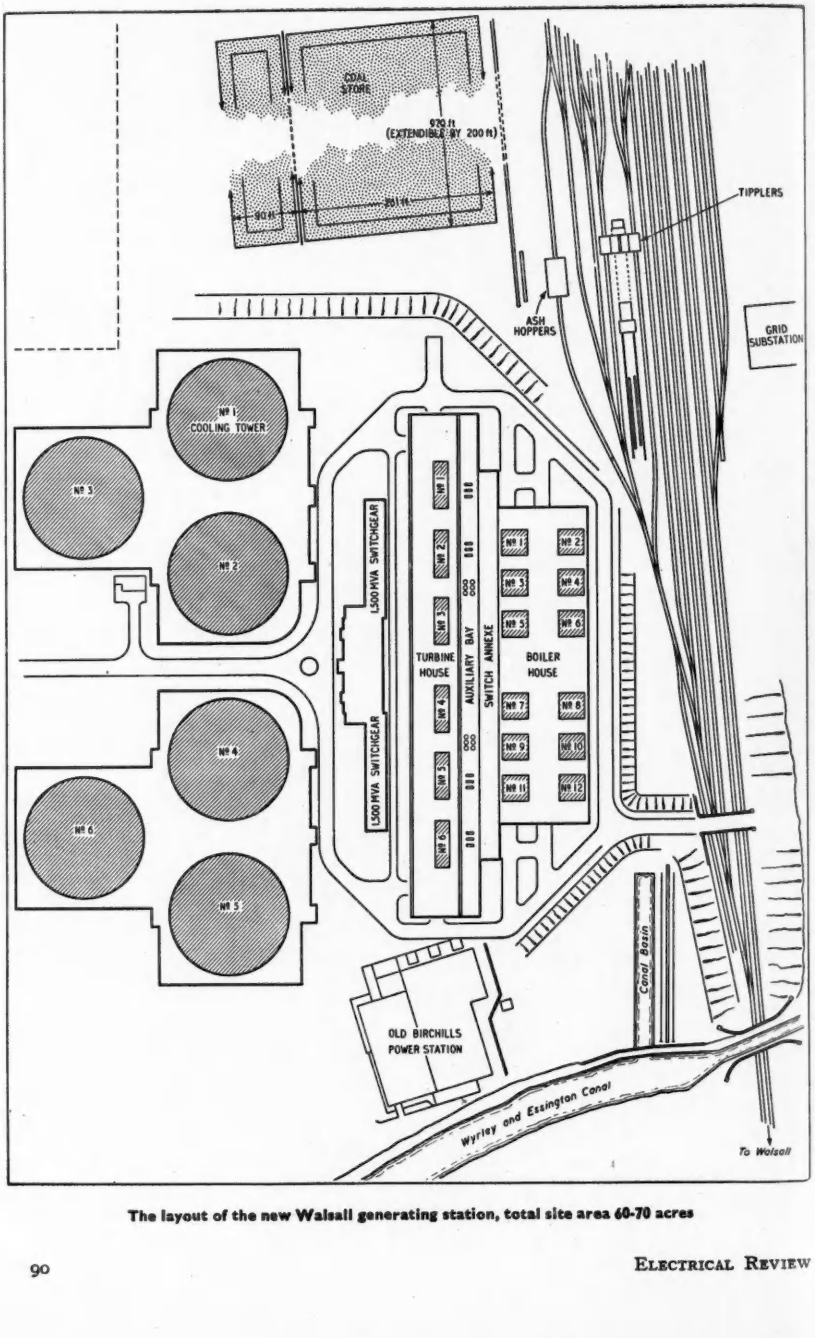
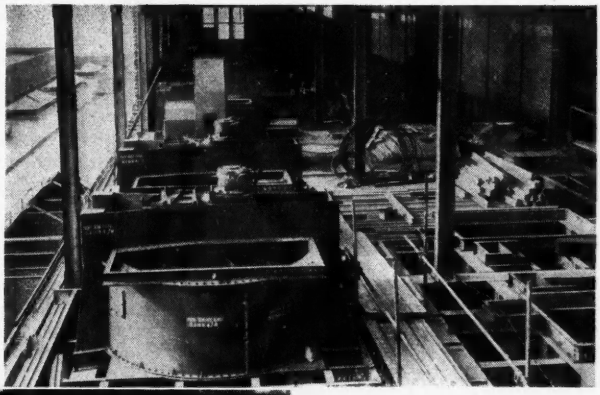


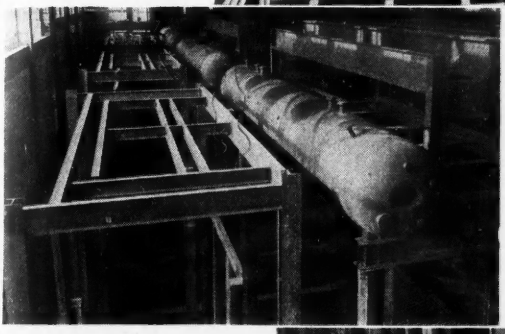
The layout of the new Walsall generating station, total site area 60-70 acres

are in pits below the basement floor on the south side of the turbo-alternators and at a level of 456ft. The Hick Hargreaves extraction pumps are similarly situated on the north side of the turbo-alternators. At operating floor level in the feed-pump bay are the Weir feed pumps, of which there will be 24 all told, three motor-driven and one steam turbine-driven pumps for each set.

In this bay are also housed the (Hick Hargreaves) feed-water heaters, of which there are three high pressure and one low pressure units per set, i.e., to suit four-stage bleeding. These heaters rise from the basement level at 450ft o.d. up through an intermediate level between the basement and the operating floor.

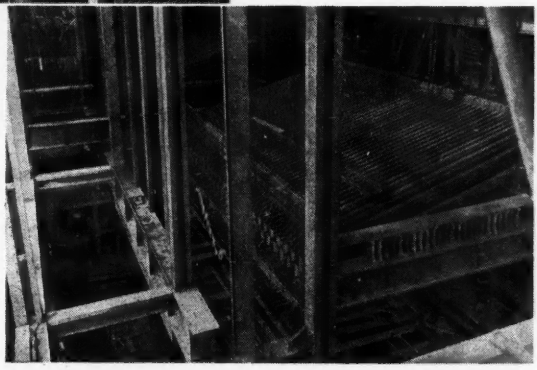
Aiton & Co. evaporators are also being housed in the feed-heater bay. These comprise a central evaporating plant and will be made up ultimately by four triple-effect units in two pairs of two each, situated evenly about the centre line of the station. The evaporators rise from the basement level, which is at 450ft o.d., and up through the turbine house general floor. At the top of the feed-heater bay, with a floor level 40ft above the firing floor, is a tank room housing the surge, reserve and treated-water tanks.





The journey down the erectors' lift afforded "shots" at the fan floor, 536 ft above boiler drum, 50ft above firing floor (left), and inclined generation tubes and headers 21ft above firing floor

The boiler house does not run the full length of the main buildings, but its 410-ft length has the same cross central line as the turbine house.



It is about 120ft wide. The ash basement level is 450ft, the firing floor level is 468ft, and above this the boiler house

rises to a roof height of about 560ft. On either side of a 25-ft wide central firing aisle there are being installed with facing fronts two lines of boilers with six boilers in each line. Above this central firing aisle are the coal bunkers, which have a top level of 544ft. Centrally above this from the boiler house roof rise the six sheet-steel chimneys to a total height of 717ft. Two of the chimneys are completed. In the base of each chimney is a dust collector.

Each of the Babcock & Wilcox 150,000 lb per hour normal rating boilers has its chain-grate stoker top level about 3ft above the firing floor, and from this the combustion chamber rises to a mean point at the bottom of the inclined steam generation tubes 21ft above the firing floor. At bottom levels of 31ft and 39ft are the secondary and primary banks of superheaters towards the front side of the boiler. Each boiler has a single drum and the drum in each case has its centre line about 50ft above the firing-floor level.

About 6ft behind the central vertical line of the drum is the inner side of the economizer, which extends about 9ft to the other side and rises from a lower level of about 20ft above firing-floor level to about 40ft above this level. Each boiler is served by two Howden-Ljungstrom air preheaters, two forced-draught fans and two induced-draught fans, and these are all installed on a fan floor. Two secondary air fans are situated behind the boiler at firing-floor level.

Construction is most advanced at the west end, and we saw No. 1 boiler with the steam generating, superheater, economizer and combustion-chamber wall tubework all completed, but the chain-grate stoker was not in position. From this stage the present state of development becomes lower and lower eastwards, and the facing boilers 7 and 8, 9 and 10, and 11 and 12 have not yet been started.

The auxiliary-switchgear annexe has four floors above the basement level. The second floor is at the turbine house operating floor level, and the chamber between this and the next floor up forms a distribution board floor. The next chamber up houses the auxiliary switchgear, and finally at the top, with a floor level the same as that of the adjacent tank room above the feed-pump bay floor, constitutes a suite of offices. Thus we saw on the third floor, well advanced, Ellison 3.3 kV and 400 V auxiliary switchgear.

The separate main switchgear and office block rises to a top level about the same as the turbine-house crane level. The central office block is about 150ft long and the top floor of this is the control room. The two wings to this block house the 33 kV main switchgear at ground level. The generation voltage is 33 kV. In the east wing is 500 MVA switchgear, while in the west wing is 1,500 MVA switchgear. The higher rupturing capacity switchgear provides for the alternator and grid connections, while the lower rupturing capacity switchgear serves the Birchills power station, local major distribution and auxiliaries supplies.

In each wing the switchgear is in two sections which are separated by two isolated bus-bar couplers. In the control room cellular type boards for the 1,500 MVA and 500 MVA switchgear take the same form diagrammatically as the actual switchgear. All the switchgear and control equipment is by Ferguson Pailin.

The coal-handling system on the north side of the main buildings incorporates barge unloaders over the canal basin which will serve an inclined conveyor up to a junction tower roughly in line with the transverse central line of the boiler house. On the other side, i.e., west of the junction tower, there will be inclined conveyors running up from the wagon tippler hoppers in the N.E. corner of the coal storage ground. The east and west inclined conveyors will pass their fuel *via* a hopper and chute system in the junction tower up to the boiler house bunkers, to another inclined conveyor feeding shuttle belts over the bunkers.

From the tipplers the conveyors to the coal store will operate both ways, so that rail-borne coal can be passed right through to the storage ground. The coal-handling plant is being supplied by Mitchell Engineering, Ltd.

The Babcock & Wilcox paddle ash-handling system incorporates a belt conveyor under each line of boilers, both of which serve a cross conveyor in a tunnel at the west end of the boiler house.

We thank Mr. L. F. Jeffrey, chief generation engineer (construction), and senior members of his staff for their help in obtaining this information.

Views on the News

By REFLECTOR

WITH my latest electricity account I have received a notification from the South-Eastern Electricity Board of the 0.35d per kWh increase during the current quarter. It includes a note to the effect that the increase "will not apply to tariffs which already provide for a lower unit charge in summer than in winter." I might have been elated by this if the London J.E.A. before its absorption had not levelled up its summer and winter charges in my area. Anyway, this is the first mention I have seen of the non-applicability of the increase to differential rates.

★ ★ ★

There is a general impression among English consumers that they are paying more than enough for their electricity, and they will therefore be surprised to know that they are being subsidized by the Scots. This was the contention at a recent meeting of the Edinburgh Town Council, which decided to make further "representations" to the South-East Scotland Electricity Board on the subject. At the same meeting a member of the Council criticized the lower efficiency of the service under nationalization. *The Scotsman* reports that he averred that "people were now having to switch on two lights where previously they had used one. Where they had previously used one element of their heaters they now had to use two." The same speaker seemed to be under a misapprehension when he said that he had found that in most districts of London no increases were taking place.

★ ★ ★

Ways and means of rendering electrical components used in aircraft more fit to withstand extremes of climate and altitude attracted my attention when I visited the Telecommunications Research Establishment (Ministry of Supply) at Great Malvern last May. One result of the employment of better quality materials, magnetic and insulating, to this end has been an appreciable reduction in size and weight of the components. How the design and construction of small transformers has consequently changed is explained in the paper prepared by Mr. A. Langley Morris for the I.E.E. Utilization Section this week. They are sealed in containers filled with silicone fluid, thus lowering thermal gradients and avoiding corona discharge, which has caused trouble in small 1,500V air-filled transformers. The high premium placed on weight by aeronautical engineers justifies the employment of expensive materials. While this consideration will not be of equal urgency in ground service, many of the data collected at Malvern seem to me to be applicable to power practice in general.

★ ★ ★

It was reported in the *Electrical Review* some time ago that the North Western Electricity Board had acquired the Haddon Hall Hydro, Buxton, intending to use it as a staff training college. The British Electricity Authority evidently thought that this was too ambitious in an Area Board (although it was proposed to share the Hydro with other Boards) and so it has stepped in and taken the building over. It will be employed for the original purpose, on a wider scale, embracing the Area Boards and Divisions in the North of England and South Scotland.

★ ★ ★

A smallholder, writing in the *Western Morning News*, complains about the delay in getting an electricity service. A year or so ago guarantee forms were signed by a group of residents and subsequently, after threats to withdraw from the scheme if the installations were not carried out before the end of 1948, wiring contracts were presented and signed; ". . . within a few days," adds the writer, "my premises were draped in orderly array with a multitude of cables which, however, in the third month of their display, remain as current-less as the blood vessels of a moribund mammal." Let him not despair. From another journal I learn that the tenants of a number of houses near Kirkcaldy have "dusted their useless switches and empty lighting sockets" for the past 17 years, and are now hoping to have electricity installed some time this year.

Modern Steam Conditions

ECONOMICS OF PRESSURE AND RATING

IN a lecture to the London Technical Group of the Electrical Power Engineers' Association last week, Mr. F. D. Roberts (Metropolitan-Vickers Co.) discussed problems arising out of the adoption of high steam pressures and temperatures for turbines. This trend had resulted in great improvements in thermal efficiency, but above 1,000 lb/sq in. the advance to be expected, based on the latest (1939) steam tables, was appreciably lower than those estimated from the earlier (1931) tables. Thus the improvement for turbines of 50,000 kW at 3,000 r.p.m., which was 2.6 per cent for the first 300lb above 600 lb/sq in., fell to 1.6, 1.0 and 0.6 per cent for each succeeding 300lb; the improvement due to temperature was 3.5 per cent per 100 deg F. For smaller units improvement would be less, due to smaller blade heights and greater gland losses. To avoid blade erosion, wetness in the final stages should not exceed 12 to 14 per cent.

Most Economic Rating

The most economic pressure was decided by the cost and calorific value of the fuel, plant load factor, capital charges and maintenance. The 1931 estimate of 1,380 lb/sq in. had been reduced to 1,040lb, but 20 per cent lower pressure would increase the overall cost/kWh sent out by only 0.00125 per cent. This latitude had facilitated standardization of steam conditions at 900 lb/sq in. and 900 deg F for 60,000 kW sets and 600lb and 850 deg for 30,000 kW sets.

Advantages of a most economic rating that coincided with the maximum rating, instead of 80 per cent of it, were the avoidance of an extra nozzle group or bypass valve to be opened above the economic rating. These changed the pressure distribution and temperature gradient throughout the machine and might add 50 per cent to the weight of the h.p. cylinder, which also complicated the starting-up process. A machine designed for 100 per cent economic rating had normally a better heat consumption when operated on base loads above 85 per cent. The amount of allowable creep (due to continued stress at high temperatures) was limited in United States practice by restricting the temperature generally to 15 deg F above nominal, although 25 per cent was permitted for 5 per cent of the total time and 50 per cent during 15 min swings for 1 per cent.

Various additions to the normal governing gear, which were in use as a whole on recently exported machines, were described; they included load and overspeed limiting gear, initial-pressure-operated and vacuum-operated pay-off gear and vacuum-operated trip gear for coping with steam entrained in the supply piping due to operating exigencies.

The mass ratio of the cylinder to the rotor, which might be 2 to 1 with moderate steam conditions, might rise to 8 to 1 for 80 per cent economic-rated machines and 6 to 1 for the 100 per cent design, so that with high steam conditions the rotor was subjected to more rapid changes of temperature than the cylinder. This necessitated a defined procedure when starting up and after shutting down, which could be facilitated by the provision of available electronic instruments which indicated irregularities in expansion that could be corrected before damage resulted. The lecture was illustrated with numerous lantern slides of performance graphs and interior arrangements of turbines.

Marine Radar Film

A PREVIEW of a short instructional film on marine radar was held in London recently by Marine Instruments, Ltd., marine division of Kelvin & Hughes, Ltd. This film demonstrates very clearly what a marine navigational radar set looks like and can accomplish when fitted to a typical vessel engaged on a regular routine voyage. Scenes are shown throughout the manufacturing process in the company's factory at Barkingside up to final packing for shipment. The next stage takes place on board the M.V. *Munster* at Liverpool where a set is seen being unpacked and installed, the engineer explaining the function of the various controls to the deck officers. Then the ship leaves her berth and moves out into the Mersey and the radar screen shows the positions of passing ships, shore landmarks and buoys.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Anglo-American Collaboration

IN the report of the first session of the Anglo-American Council on Productivity is a paragraph which, in my opinion, is charged with significance. It reads: "It is the view of the Council that the problem of productivity is to a great extent a problem of spreading 'know-how' and technique. If knowledge of the best practice in the United Kingdom itself can be made more generally available and supplemented by knowledge of the best practice in the United States and other countries, much will have been accomplished towards the solution."

The logic of that view is unassailable. There is within the experience of our company a striking demonstration of the great value of the free interchange of "know-how" and technique. This year marks the 50th anniversary of the Driver-Harris Company of America, with which we are associated. Although the two companies operate quite independently in both manufacturing and marketing, there has been, during a large part of those fifty years, continuous and active liaison for the free interchange of technical information.

This close collaboration on technical development has resulted in considerable advances in nickel alloy production that have yielded, as an example, electrical resistance materials of the calibre of Nichrome. It is for that reason that I endorse wholeheartedly the view of the Anglo-American Council.

R. M. PARRY,
Managing Director,
British Driver-Harris Co., Ltd.
Manchester, 15.

Submersible Motors

IN your 24th December issue there appeared an article which stated that the "dry" type of submersible motor suffers from appreciably reduced efficiency and power factor due to the use of a non-magnetic stainless steel tube to seal the windings from the ingress of water. Such is not the case.

The losses which occur in the stainless steel tube of a properly designed submersible motor are a small proportion of the whole as shown by the fact that the efficiencies of such motors, in spite of their unusual dimensions, are very close to those of normal induction motors. For instance, the guaranteed efficiency of a 35 b.h.p. submersible motor in which I am interested, using a stainless steel tube in the manner mentioned by the author, is 84 per cent.

With regard to the power factor, the author is surely aware that all losses that occur in electrical apparatus are supplied by a current in phase with the supply voltage and far from the eddy current losses reducing the power factor, as the author states, they actually improve it. The power factor of a 35 h.p. motor is 0.85.

I understand that the "dry" type of motor with air compressor and air line is not now being manufactured and I am aware of only one Continental make employing a water ring for supplying air to the motor under emergency conditions. Apart from interruption of air supply to the motor (e.g., through failure of electricity supply) the air in the motor is bound to become moisture laden and may result in the failure of the insulation.

In connection with the remarks concerning the vertical spindle pump, I understand that an American manufacturer is producing these pumps to operate at 3,000 r.p.m., but I should like to know what the shaft losses are and the expected length of life of the bearings, even under the most favourable conditions of sand-free water and truly vertical borehole.

T. E. PENLINGTON,
Graduate I.E.E.
Sutton Coldfield.

Contract Price Adjustment Formulae

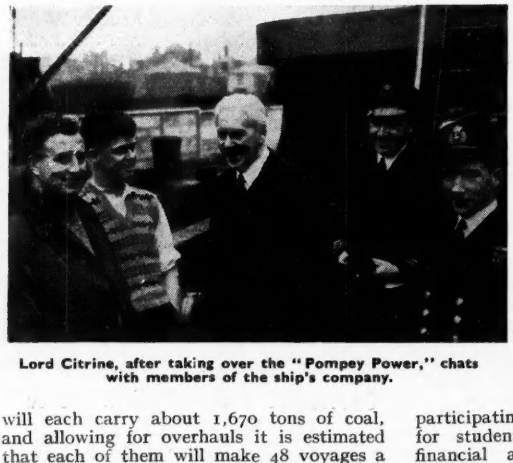
THE following are the latest figures for use in the B.E.A.M.A. contract price adjustment formulæ:—Rates of pay: The rate of pay for adult male labour at 8th January is deemed to be 115s. Costs of material: The Board of Trade index figure for intermediate products at 8th January is 254.1 and is the figure for December.

New B.E.A. Collier

CEREMONY AT PORTSMOUTH

ON Friday last the *Pompey Power*, a new 1,780-ton collier which had reached Portsmouth the previous day with its first cargo, was officially handed over by the Corporation to the British Electricity Authority. The Corporation flag was struck by the Lord Mayor of Portsmouth, Councillor F. Miles, and Lord Citrine hoisted another bearing the letters "B.E.A." Lord Citrine said he understood something of the regret which must be in the minds of the Lord Mayor and his fellow councillors that this vessel had to be surrendered to a national body. It was, however, a transference from one public body to a larger one which he hoped would never be lacking in those qualities which had distinguished the Portsmouth undertaking.

The vessel joins a fleet of 25 already owned by the B.E.A. A further nine are under construction and the Authority is using 17 ships by private charter to carry some of the 27,500,000 tons of coal burnt annually in the production of electricity. The *Pompey Power* and her sister ship the *Pompey Light*, which will be completed and delivered in a few weeks' time, will each carry about 1,670 tons of coal, and allowing for overhauls it is estimated that each of them will make 48 voyages a year.



Lord Citrine, after taking over the "Pompey Power," chats with members of the ship's company.

The *Pompey Power*, built by S. P. Austin & Sons, Sunderland, is designed for a service speed of 10 knots and is equipped with two boilers, the normal operating conditions of which are 220 lb/sq in at 700 deg F. The main engine is an 850 i.h.p. North-Eastern Marine triple expansion type with reheating arrangement and is fitted with poppet valves on the high and intermediate pressure cylinders. Two Belliss and Morcom 120 h.p. auxiliary engines are also installed driving B.T.H. 80 kW, three-phase, 400 V, 50 c/s alternators. All engine room auxiliaries except a standby steam feed pump are driven by induction motors, double cage machines being used on the deck machinery. Metropolitan-Vickers "Seascan" radar is fitted, together with a Marconi echo-sounding device. The usual radio-telephone is provided, with a listening extension in the officers' mess, and for broadcast radio programmes a common receiver is wired to all mess and recreation rooms.

Interchange of Students

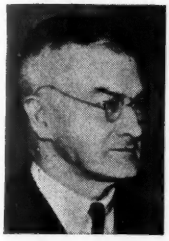
THE first annual report of the International Association for the Exchange of Students for Technical Experience is indicative of the great change that has come about in international understanding since 1938, when efforts made to interchange students on a similar basis failed. The initial success of the later venture justifies hope of its further development, although there is evidence of lack of appreciation in one or two countries of the need to select and brief students with great care.

Preliminary conversations have taken place with four more countries, additional to the ten already participating. The latter exchanged 920 students during the summer vacation period in 1948, the 191 incoming and 194 outgoing from Great Britain being an increase of 172 on the previous year. The Imperial College is to broaden the exchange to include undergraduates from more universities and colleges. An effort is being made to render the organization self-supporting by affiliation fees for participating colleges and registration fees for students nominated, while offers of financial assistance have been received from industrial organizations. The Ministry of Labour and National Service (International Labour Office) is co-operating with "Iaeste" which has been granted consultative status by "Unesco." The secretary of the Association is Mr. J. Newby, Imperial College, South Kensington, London, S.W.7.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Council of the Institution of Electrical Engineers has elected **Capt. J. M. Donaldson,** M.C., to honorary membership of the Institution for his distinguished contributions to electrical power engineering, particularly in the fields of generation, transmission and distribution; and for his services to the Institution. The Council has also made the twenty-seventh award of the Faraday Medal to **Mr. C. S. Franklin** for his distinguished work in radio engineering, and in particular his original studies of short-wave wireless transmitting and receiving circuits, and his invention of the beam aerial, through which the practical use of short-wave transmission paths for communication purposes was established.



Capt. J. M. Donaldson

Mr. C. S. Franklin

Capt. Donaldson is, of course, well known for his long association and work with Northmet Power Co. He became general assistant engineer in 1906, chief engineer in 1920, general manager in 1936, and a director of the company in 1943. He carried out much pioneer work in the field of supply, particularly in the use of steam at increased pressures and temperatures in the generating plants for which he was responsible. He is now a member of the Eastern Electricity Board. Capt. Donaldson served as a member of the Council of the I.E.E. from 1923-26, and was president of the Institution in 1931. He is a member of the Institution of Civil Engineers, and has served as chairman of the Council of the British Electrical and Allied Industries Research Association.

Mr. Franklin spent almost his entire career with Marconi's Wireless Telegraph Co., Ltd., joining the company in 1899, when the company was known as the Wireless Telegraph and Signal Co. He was continuously associated with research and development in radio engineering with that company until 1939, when he retired from active work. He still serves as a consultant to the company. Among the many outstanding developments for which he was responsible were reaction patents for wireless receiver circuits, the early British broadcasting stations, directional receiving systems for long-wave communication circuits, rotating beam aerials, short-wave wireless transmitting and receiving circuits, and in particular the beam aerial array associated with his name. He also developed the concentric cable system which enables high-frequency currents to be transmitted with minimum loss, such as are essential in television practice. Mr. Franklin was awarded the Wireless Premium of the I.E.E. in 1922 for his paper on "Short-Wave Directional Wireless Telegraphy," and he was the first recipient of the James Alfred Ewing Medal, instituted in 1936 in memory of Sir Alfred Ewing by the Institution of Civil Engineers.

Mr. P. McNab Miln, B.Sc., A.M.I.Mech.E., A.M.I.E.E., has been appointed as an additional member of the North Western Electricity Consultative Council.

Sir Henry Self, deputy chairman, administration, of the British Electricity Authority, is to replace Sir John Hacking, deputy chairman, operation, on the Council of the British Electrical Development Association. Sir John finds his time fully occupied by technical matters, and the technical side is already well represented on the Council.

Mr. Rex Bate has been appointed a local director of the Brush Electrical Engineering Co., Ltd., with the title of sales director. Mr. Bate, who joined the Brush Co., in February, 1946, as manager of the transformer department, was appointed general sales manager a year later. He received his technical education at Loughborough College, after which he was employed for three years by the Fuller Electrical & Manufacturing Co. at Walthamstow. From 1932 to 1935 he served in the technical and research department of the Central Electricity Board, and in 1937 he was appointed manager of the Calcutta office of Asea Electric, Ltd. He

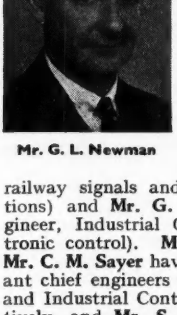
Mr. R. Bate

held a commission in the Royal Indian Engineers during the last war and served on the staff of the 14th Army.

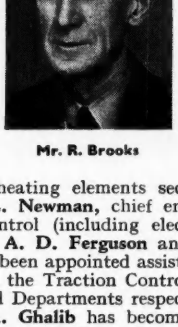
Mr. V. A. Pask, chief engineer, British Electricity Authority, has been nominated to represent the Authority on the Engineering Standards Committee. The establishment of this Committee was announced by the Minister of Supply in the House of Commons in November. Sir Ernest Lemon, the chairman, requested the Authority to send a representative to discuss the part which it could play, in common with other nationalized industries, in setting up and using standards for engineering products.

Mr. J. D. Nicholson, B.Sc., A.M.I.E.E., at present section head (engineering) planning and development, with the South-West Scotland Electricity Board, has been appointed deputy chief engineer to the Yorkshire Electricity Board. He will take up his new duties as soon as his release can be arranged.

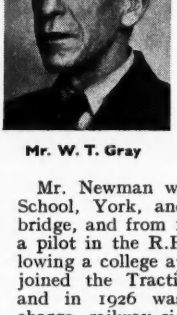
In view of his impending retirement **Mr. R. Brooks** has relinquished his position of chief engineer, Control Department, of the Metropolitan-Vickers Electrical Co., Ltd., from 31st December last. **Mr. W. T. Gray** has been appointed chief engineer, Traction Control Department (including the railway signals and heating elements sections) and **Mr. G. L. Newman,** chief engineer, Industrial Control (including electronic control). **Mr. A. D. Ferguson** and **Mr. C. M. Sayer** have been appointed assistant chief engineers of the Traction Control and Industrial Control Departments respectively, and **Mr. S. A. Ghalib** has become engineer-in-charge, Electronic Control.



Mr. G. L. Newman



Mr. R. Brooks



Mr. W. T. Gray

Mr. Brooks, who retires on 31st January, was educated in Edinburgh, where he served an apprenticeship with Brown Bros. & Co. After periods with the Midland Railway, Derby, and Siemens Brothers, Stafford, he went to Trafford Park in 1918, joining the M.-V. Switchgear Engineering Department and became chief engineer there in the following year. Shortly afterwards he was appointed chief engineer of the newly formed Traction Control Department, and for more than twenty years he was associated with many large railway electrification contracts, including the Southern suburban system, the London-Brighton main line, and various sections of the South African railways. His responsibilities were increased by the addition first of the railway signals, heating elements, and train lighting sections, and finally of the new radar engineering section (later a separate department). Since 1941 he has held the additional position of chief engineer, Industrial Control Department (incorporating also electronic control). Mr. Brooks has served on various committees of the B.S.I. and E.R.A. and also on the committee of the North-Western Centre of the I.E.E.

Mr. Gray was educated at George Watson's College and Heriot Watt College, Edinburgh. After serving in the Royal Scots during the 1914-18 war, he joined M.-V. in 1920, starting as a junior engineer in Traction Control Department. From 1930 onwards he acted as deputy to the chief engineer of the Department, and he has been associated with many important traction contracts, e.g., the pioneer metadyne-controlled trains for the London Underground system and the freight and passenger locomotives for the Great Indian Peninsular Railway. He was appointed assistant chief engineer in 1945. During the last war Mr. Gray was associated with the development of "Beetle" miniature tanks, and was later seconded to the Ministry of Supply as consulting engineer, Projectile Development.

Mr. Newman was educated at Bootham School, York, and Christ's College, Cambridge, and from 1916 to 1918 he served as a pilot in the R.F.C. (later R.A.F.). Following a college apprenticeship at M.-V. he joined the Traction Control Department, and in 1926 was appointed engineer-in-charge, railway signal section. In 1936 he took over the projector section and was engaged throughout the war on special Government work in connection with searchlights, sound locators, and radar aerials.

In 1945 Mr. Newman became engineer-in-charge of the newly formed Electronic Control Department, and, at the end of 1946 he received the additional appointment of assistant chief engineer, Industrial Control Department.

Mr. D. P. Besley, general manager of the radio and electrical group of Brown Brothers, Ltd., who has been ill for several months, is making progress, but as it will be some time before he is able to resume work, the company has made changes in its administrative organization. **Mr. P. A. Johnson,** at present manager of the Acton branch, becomes assistant general manager of the company and from 1st February will transfer to the head office to take charge of the radio and electrical group. **Mr. G. A. Pemberton,** at present manager of the Manchester branch, takes over the management of the Acton branch, and **Mr. T. Sutherland,** sales supervisor at the Newcastle branch of the associated company, Thomson & Brown Brothers, Ltd., becomes Manchester manager.

Mr. A. C. Eden, B.Sc., A.M.I.E.E., assistant engineer of the No. 2 Sub-Area of the Merseyside and North Wales Electricity Board, has been appointed engineer of the Fens Sub-Area of the Eastern Electricity Board in succession to **Mr. A. D. Church,** M.I.E.E., who, as we have already reported, is leaving this country to take up the appointment of assistant manager in charge of operations to the Public Service Co., Ltd., Jamaica.

Mr. D. G. Nairn has been co-opted to the board of J. & F. Stone Lighting & Radio, Ltd., and has been appointed chairman in place of **Mr. N. W. Wild,** who has resigned.

Mr. W. A. Borrowdale has retired from the position of generating station superintendent at Weymouth, and Mr. T. Whitehouse, on behalf of the staff of the Southern Electricity Board and of the Weymouth Corporation, has presented him with a leather armchair.

The Minister of Fuel and Power has appointed **Alderman Henry Coates,** J.P., M.I.E.E. (a director of the Watford Electric Manufacturing Co., Ltd.) as an additional member of the Electricity Consultative Council, for the Eastern Area.

Mr. H. Pickup, B.Sc., A.M.I.E.E., of Ormskirk, has been appointed to the position of district consumers' engineer, No. 2D District of No. 2 Sub-Area, by the North-Western Electricity Board. He joined the mains staff of the former L.E.P. Co. in 1932, and after the war he was appointed district engineer and manager at Ormskirk.

Mr. W. Oades, a senior assistant to the commercial officer, Wear Sub-Area, Sunderland, has been appointed district commercial officer in South Shields under the North-Eastern Electricity Board. Before going to Sunderland Mr. Oades served with the North-Eastern Electric Supply Co., Ltd., at Newcastle. At South Shields he succeeds **Mr. G. B. Pierpoint,** deputy senior executive electricity officer, who is leaving to become manager of the Huntingdon district of the Eastern Electricity Board.

Mr. C. K. F. Hague, M.I.Mech.E., managing director of Babcock & Wilcox, Ltd., was re-elected president of the British Engineers' Association for a second term of office at the January meeting of the Council of the Association. **Mr. K. Fraser,** M.A., M.I.Chem.E., chairman and managing director of W. J. Fraser & Co., Ltd., was also elected vice-president of the Association for the second term of office.

The chairman of the East Midlands Electricity Consultative Council is **Mr. L. L. Perkins** (Market Deeping), and not Mr. L. L. P. Baston, as incorrectly stated in our last issue.

Capt. A. C. Timmis, B.Sc., M.I.E.E., assistant staff engineer in the G.P.O. Engineering Department, is retiring at the end of this month. Capt. Timmis, who joined the Department in 1908 after works experience with the Lancashire Dynamo Co., has for twenty-five years been associated with research on line communications and has particular knowledge of military and foreign practice.

Mr. F. C. Edmondson, who has been general manager of the Perth Electricity and Gas Department since 1929, has now been appointed general manager of the State Electricity Commission (the State recently purchased the electricity and gas undertaking from the Perth City Council).

Mr. T. H. Eccles has been appointed manager of the London office of Musgrave & Co., Ltd., in succession to **Mr. T. A. Patterson,** who has resigned.

At the end of last year **Mr. A. Harrison** relinquished the position of sales director of Victor H. Iddon, Ltd. He has been succeeded by **Mr. C. G. Hunt.**

Mr. V. Watlington has been re-elected independent chairman of the Electrical Fair Trading Council, and **Mr. T. W. Heather** vice-chairman.

The London office staff of **Crompton Parkinson, Ltd.,** and their friends, 300 in all, gathered for the Christmas and New Year party of the Crompark Social Club at the Holborn Restaurant, High Holborn, London, W.C.2, on 7th January. Guests of the club included Mr. E. C. Holroyde, vice-chairman of the company, and Mrs. Holroyde, Mr. J. Harwood Fryer, joint managing director, and Mrs. Fryer, and Mr. T. H. Windibank, works director (south), and Mrs. Windibank. The entertainment included dancing, a cabaret, and competitions with a large number of prizes. Mrs. T. H. Windibank presented the prizes to the successful competitors.

The Telcon Staff Association (**Telegraph**

Construction & Maintenance Co., Ltd.), held its first annual dinner and dance in the Balmoral Room, Connaught Rooms, on 10th January, when 200 members of the staff and friends attended. The chairman of the Association, Mr. F. Leighton (works manager) proposed the toast of the Telegraph Construction & Maintenance Co., Ltd., and Lord Colgrain (chairman of the company) responded. Sir Geoffrey Clarke (managing director) proposed the toast of the Association and Dr. G. A. V. Sowter suitably responded. Amongst those present were Messrs. J. N. Dean, B. H. Musgrave, W. F. Randall (directors), and Dr. E. W. Smith (director of Submarine Cables, Ltd.).

The **Electrical Association for Women** has awarded the Councillor Miss Walter Rosebowl for 1949 to the South-East Essex County Technical School, Dagenham, which has won it for the second year in succession. The runner-up was the Central Secondary School for Girls, Gloucester. In view of the fact that several colleges, including a Domestic Science Training College, have now affiliated to the Association, the National Executive Committee has agreed that the affiliation scheme shall in future be known as "The E.A.W. Affiliation Scheme for Schools and Colleges."

The Sheffield Branch of the **Electrical Industries Benevolent Association** held a dinner and ball on 7th January at the Victoria Hotel, Sheffield. Mr. A. J. Cheyne, chairman of the Branch, presided, and among others who attended were Mr. A. Webb, hon. branch secretary, and Mrs. Webb, Mrs. Cheyne, Mr. H. S. Fothergill (Association secretary), Mr. S. Whitlam, hon. branch treasurer, and Mrs. Whitlam, and Mr. C. R. Waterhouse and Mrs. Waterhouse.

The fourth annual Christmas party for the children of employees of the **Electric Furnace Co., Ltd.,** was held on 8th January. About eighty children attended, most of them arriving by coach, which was conducted by Santa Claus in person. On arrival at Hardwick Court they were divided into two groups, the smallest ones being entertained by honorary aunts and the larger compèred in a series of fun and games by Mr. Pond. Subsequently the whole gathering was amused by Mr. Bertram Otto. After tea, gifts were distributed from the Christmas tree.

The annual sports of the **Indian Cable Co., Ltd.,** were held on 2nd January on the factory recreation ground at Tatanagar, Bihar, India. The heats had been run off on the previous day and the finals of track and field events occupied about four hours of sustained interest. The Championship Cup was won for the fifth successive time by P. Ramalingham (welder) and the special silver cup presented by British Electric Co., Ltd., of Calcutta, for the 100 yards sprint, was won by R. M. Thampi (typist). After tea there was a fancy dress competition, followed by the presentation of prizes by Mrs. E. D. Johnson.

The annual staff party of **Victor H. Iddon, Ltd.,** was held on 7th January at the Princess Ballroom, Chorlton. About 250 employees and guests sat down to dinner, following which the toast of the company was proposed by the chief designer, Mr. J. G. Goodliffe, to which Mr. L. S. Hargreaves, managing director of the parent company, Aerialite, Ltd., replied.

The Elliott Long Service Association of **Elliott Brothers (London), Ltd.,** formed for employees with over twenty-five years of service (ladies twenty years) held its annual dinner at Lewisham on 14th January. The total membership of the Association is 140, of whom 105 attended the dinner. Of these ninety-eight are still "on active service" with the company with an average of thirty-four years each. Unfortunately, many of the directors were unavoidably absent, Mr. L. Bagrit, the managing director being still aboard the *Queen Elizabeth* on his return from a business trip to Canada and the United States.

Obituary

Mr. C. B. Macfarlane.—The death occurred on 11th January, at his home, Rennie Brae, Kilrenny, Fife, of Mr. Charles B. Macfarlane, who was an original director of the Macfarlane Engineering Co., Ltd., Cathcart, and served the company as director and secretary from 1911 until his retirement in 1941. He was born in Glasgow in 1875, and all his life was associated with the engineering and accountant interests in that city.

Mr. E. J. Pond.—The death occurred on 5th January, at the age of seventy-six, of Mr. Ernest James Pond, who was formerly Henley's Midland district superintendent, retiring at the end of 1937. He joined the company in 1900 and five years later he was appointed manager of their Birmingham branch, continuing in that capacity until 1932, when he became Midland district superintendent.

Mr. A. E. Dover.—The death occurred on 1st January in Coventry at the age of eighty-five, of Mr. Albert Edward Dover, chairman of the Spiral Tube & Components Co., Ltd.

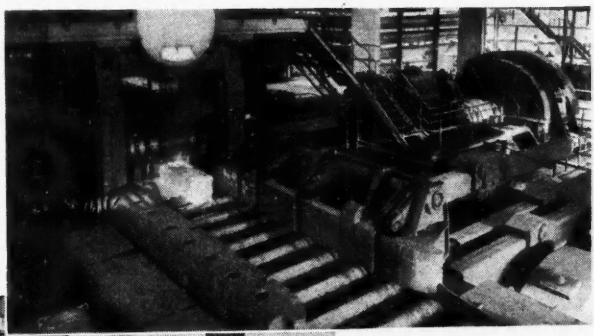
Mr. G. Nicholson.—The death occurred on 13th January, at the age of sixty-eight of Mr. G. Nicholson, A.M.I.E.E., former borough electrical engineer at Weymouth. Mr. Nicholson had been associated with the Weymouth electricity undertaking since 1904, and became borough electrical engineer in 1920. He retired during the war.

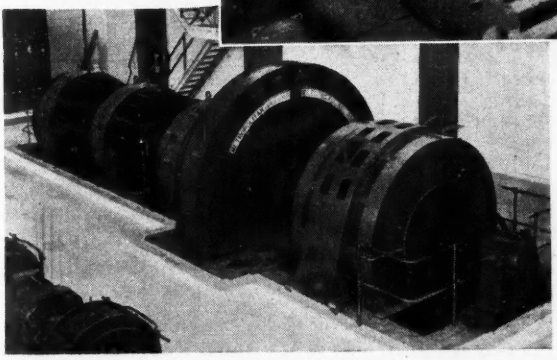
Manufacturing Progress

PLANT BUILDING RECORDS AND SHIPMENTS

THERE were record shipments during the past twelve months from the several factories of the **Metropolitan-Vickers Electrical Co., Ltd.** More than a third of the company's total output and half the generating sets it is constructing are going abroad, while the company's gas turbines and jet propulsion engines continue to be prominent in the news.

Turbine manufacturing facilities are being increased to three times the 1939 capacity. Twenty-seven turbo-generators despatched during 1948 ranged in size from 1,500 to 60,000 kW, eight of them exceeding 25,000 kW in capacity; most of the generators were for 11 or 6.6 kV, though some stators were wound for 33 to 22 kV.





Reversing 40in cogging mill at Middlesbrough driven by a d.c. 16,500 h.p. (peak) motor in conjunction with (left) a 175,000 h.p.—sec flywheel motor-generator set

Eighty sets, a record number, in course of manufacture and on order have an aggregate capacity of two million kW and forty of them have individual ratings of 25,000 kW or more. All the 75 MVA 3,000 r.p.m. generators will be designed for hydrogen cooling; the erection of the first set of this kind to be built in this country is nearing completion at Littlebrook. The company is still the largest supplier of generating equipment for the British Electricity Authority. All but two sets to be installed at home will be supplied complete with condensing and feed heating plant.

The largest machines ordered for export are two 25 MW duplicates of sets already shipped to South Fremantle; condensing and feed heating plant of M.-V. design will be made for them by Thompsons (Castlemaine), Ltd., in Australia. The company was the main contractor for the whole of the civil, mechanical and electrical work, including three substations and a 66 kV transmission line, involved in the building of the Catalagzi power station in Turkey, which was commenced in 1945 and opened in November last; two 20,000 kW sets are now running and the erection of the third has been completed.

The last of three 33 MVA waterwheel generators made for New Zealand commenced service in May. The first of three 18 MVA sets for Finland is being

assembled on site (to save time) and the second will be shipped shortly; their speed of 75 r.p.m. necessitates large diameters and heavy rotor rims. Among several horizontal-shaft generators to be driven by Pelton wheels are two for Norway, each of 35 MVA, which will be among the largest in output so far made in this country.

Large synchronous condensers have been shipped to South Africa and Spain and others are being constructed. Important orders for transformers have been fulfilled and accepted. Steel tank pumpless mercury rectifiers of 15,000 kW aggregate capacity are in hand, while glass bulb rectifiers of new design went to South Africa and Finland, as well as destinations at home.

There has been much switchgear activity. Several "Turbovisory" control equipments have been completed and "Ripplay" gear is being made for Southern Rhodesia and for controlling water heaters in New Zealand; installations are nearing completion at Rawtenstall and Barry, while that at Huddersfield is being extended. In addition to "Translay" balance busbar protective gear, the first commercial set of the Casson-Last phase-comparison type will soon be demonstrated before going into service.

Orders for instruments and relays have been greater than ever before. House service meters of a new design, other instruments, relays and domestic temperature control devices are now being made in the M.-V. part of the new Motherwell works, the Newton-Victor part of which is producing X-ray equipment.

Motor manufacture at the Mosley Road works has been fully consolidated and output increased to twice its pre-war volume. A rotor centrifugal casting plant has been installed, primarily for certain sizes transferred from the A.E.I. works at Birmingham. New vacuum impregnating plant for stators is being erected.

The size of a.c. induction motors has ranged up to 4,000 h.p., and a 7,000 h.p. synchronous machine to run at 3,000 r.p.m. is nearly completed for driving a turbo-blower in an aeronautical wind tunnel. Winders ordered for mines involve an aggregate of 48,000 h.p. of driving motors. A reversing d.c. motor of 16,500 h.p. (peak) for a 40in cogging mill with a speed range of 0/40/90 r.p.m. in either direction operates in conjunction with a Ward-Leonard Ilgner 175,000 h.p.-sec flywheel set consisting of three d.c. 1,500 kW, 675 V generators driven by a 6.6 kV, 4,000 h.p. slipring motor.

Induction melting furnace equipment has included three motor-driven 650 kW high-frequency generators and the reconstruction of a wartime plant to form a 1,100 kW 5-ton melting furnace in Sheffield. Radio-frequency equipment has included a 20 kW melting furnace and a 7.5 kW blade-hardening machine with electronically controlled mechanism for passing the blades through the induction coil.

More than thirty infra-red heating and drying installations could be mentioned. Lamps with a reflector formed of aluminium deposited on the inside of the bulb will become available this year. Tubular sheathed infra-red elements are being used for longer wavelengths than those emitted by glass lamps.

Steel mill plant, textile mill equipment, railway locomotives, motor coaches, Diesel-electric locomotives, signalling and marshalling yard gear, equipment for trolley-buses and tramcars figured among the unusually wide range of plant and products supplied.

Speaking Traffic Signals

THE first audio traffic signal, developed by Speaking Signals, Ltd., 10/12, Copthall Avenue, London, E.C.2, was demonstrated last week at the E.M.I. Works, Hayes, Middlesex, before officials of the Ministry of Transport, the Metropolitan Police, London Boroughs, the Royal Safety First Society and the Road Research Council.

This device, which may be used either alone or in conjunction with normal traffic lights, is primarily intended to further the safety of pedestrians, particularly children, who will probably react favourably to the friendly, intimate tones of the new talking principle.

The apparatus is contained in a compact, waterproof housing weighing about 30lb. and is mounted alongside the lights on the traffic signal column, the spoken directions being recorded on and reproduced from a small endless belt of plastic tape which is coated with a magnetic power such as Fe_3O_4.

Treatment by Electroplexy

ELECTRICALLY INDUCED FITS

SUDDEN illness prevented the attendance, at the Institution of Electrical Engineers, last week, of DR. MACDONALD CRITCHLEY, who was to have lectured on the medical and psychological aspects of electric shock, and some of the nervous complications. In his place, at exceedingly short notice, DR. E. B. STRAUSS, Physician for Psychological Medicine at St. Bartholomew's Hospital, gave a talk on the treatment of mental illness by electroplexy (electrically induced convulsions).

Response to Shock Therapy

Involutional states such as schizophrenia and acute anxiety states, compulsion neuroses, and so on responded to shock therapy, he said, and many thousands of sufferers from such affective disorders were being saved from certification or "hospitalization" and maintained in a state of good mental health by electroplexy. The time had come when every neuro-psychiatric out-patient clinic should have an electrical convulsant unit.

Electroplexy offered nothing new in principle, but only in method. Any apparatus which could deliver a.c. at the required voltage (accurately over a period of time measured in tenths of a second) and measure the resistance of the skull and tissues before delivering the shock, was suitable. The apparatus which he had used was portable and worked off a.c. mains; it could deliver a small current at from 0 to 150 V. The timing was electronic, depending on condenser discharge, and special thermionic pilot lights indicated the electrical integrity of the circuit and the passage of the current through the patient.

The type of electrode recommended was a plain rectangular sheet, 4 by 2in, of metal with rounded corners, soft and pliable to conform to the shape of the skull; this was held in a rubber framework and attached to a rubber band which went round the skull. Direct current should not be used, since the human body was a complex electrolytic conductor consisting of tissues bathed in sodium chloride.

The object was to produce a major fit of moderate severity. The majority of patients were convulsible with 80 V for 0.2 sec and a great number with even smaller voltages for 0.1 sec. It was better to give high voltages if necessary rather than increase the time base materially. Usually the patient was given repeated shocks until a major fit was produced, when this did not occur at once.

The use of a.c. apparatus had now been rendered out of date by the introduction of steep-wave electroplexy by the passage of a current with a steep frontage and rapid train decrement, produced by condenser discharge. The apparatus was now produced commercially under the name "Plexacon." It could be used with a.c. or d.c mains or a 12 V car battery and employed small round electrodes fastened to a "Perspex" band which clipped over the head. By its use, the patient could invariably be convulsed with the first shock and it had many other advantages over the use of sinusoidal current. It had a much higher equivalent frequency and a higher potential gradient. The initiation of a convulsion depended on the impulse breakdown effect of the first few impulses and it was desirable that the later impulses should show a rapid decrement, so as to minimize subsequent cortical neuronic bombardment. They felt it desirable to reckon the dosage in terms of total energy and therefore calibrated the shock in joules and not in volts.

Quick Recovery

Electrically induced major and minor fits were in every way indistinguishable from true epileptic seizures and lasted from 45 to 60 seconds. At Barts every Friday they convulsed from 16 to 20 patients, all of whom were able to leave the hospital within half an hour of their treatment. A few patients acquired a horror of the treatment, though they could not explain why; they admitted that it was painless.

With affective psychoses (melancholia and forms of depression which came on at the involutional or later period of life)

brilliant results could be expected and it might be said that electroplexy had robbed the latter end of life of one of its major horrors.

Dr. Strauss then replied to a number of questions. The President, referring to the horror which some patients had of the treatment, asked whether an anæsthetic could be given beforehand. Dr. Strauss said that if the patient was given 3 grains of sodium amytal by the mouth half an hour before treatment it removed any feeling of anxiety. Most patients, however, had no anxiety reactions at all, and some of them described the experience as ecstatically pleasant.

Dr. S. Whitehead (E.R.A.) asked Dr. Strauss to comment on the statement, made at a meeting of the Institution many years ago, that congenital idiots could stand five times the current that an ordinary person could tolerate. He added that in certain circumstances, which probably differed from those in shock treatment, one difference between alternating and uni-directional current was that with alternating voltages one could get twice the crest value of the voltage by the assistance of a capacitance in the skin with a certain amount of intermittent rectification, so that the human being acted as a kind of full-wave rectifier.

Dr. Strauss replied that the human brain could stand terrifically high voltages literally without turning a hair, provided the amperage was low and the time-base very short. In experimenting with electrocoma or electronarcosis he passed through the brain 2,000 V and would not hesitate to go up to 3,000 V using a pulsed wave and 1 mA or less.

Mr. Forbes Jackson said that one seemed to be pushing the patient over the edge of the precipice and at the last moment drawing him back. The speaker was not happy about the use of only one timing switch; he would like a whole row of them, in case one failed. Dr. Strauss pointed out that with the condenser discharge apparatus that question did not arise, because the time taken for the condensers to discharge themselves was less than 0.1 sec. Replying to some remarks by Mr. G. F. Shotter, he said that the object of electroplexy was to induce an epileptic fit by the passage of a current through the brain. It was the fit which was therapeutic; the current was simply used to produce the fit in a safe and convenient way. With electrocoma the object was to produce a state of complete unconsciousness for some minutes and in that case it was the coma which was presumed to be of benefit to the patient.

Mr. J. F. Shipley referred to the fact that when intense alternating magnetic fields passed through the head the person affected saw phenomena sometimes described as flashings of miniature lightning, which the late Dr. Silvanus Thompson thought were caused by eddy currents. Dr. Strauss said he could throw no light on these phenomena, which were quite common. The whole field of the electrophysiology of the brain was virgin soil and he hoped that electrical engineers would assist in the carrying out of clinical research.

United States Exports

EXPORTS of United States electrical goods during the first half of 1948 showed little change as a whole compared with the corresponding period of 1947, the total values being respectively $273,207,000 and $278,965,000. There was a steep decline in the export of radio apparatus, the total value of which was only $47,614,000 against $75,638,000 during the first half of 1947. The biggest item in this class was receiving sets valued at $17,662,000 ($30,350,000).

On the other hand there was a rise in the shipments of transmitting sets to $15,187,000 compared with $11,052,000 a year previously. Sales abroad of domestic appliances were well maintained. Noteworthy among power plant exports were diesel-driven sets $11,805,000 ($12,820,000) and steam turbine sets $4,692,000 ($7,458,000). Other interesting items are given in the table.

Class	First half 1947 $(000)	First half 1948 $(000)
Storage batteries	3,383	4,870
Flashlight batteries	2,978	3,494
Distribution transformers 500 kVA and less	1,495	2,206
Rotating convertors under 300 kW	793	983
Rotating convertors 300 kW and larger	997	797
Motors under 1 h.p.	2,409	3,963
Motors over 1 h.p.	7,292	10,679
Lamps, small filament ...	2,045	2,401
Lamps, large filament	2,475	1,697
Fluorescent, etc., tubes ...	1,368	1,974

Economic Progress

SIR STAFFORD CRIPPS' REVIEW

AT a Press conference last week Sir Stafford Cripps, Chancellor of the Exchequer, reviewed economic development in 1948 and indicated the objectives for 1949. After outlining the main tasks of 1948, he said that we were making progress to an overall balance of payments. Even when we did reach a state of overall balance, however, we should continue to have the problem of our dollar deficit. We must intensify our endeavours to earn more dollars, more especially by increasing our exports to the Western Hemisphere.

The provisional figures of exports in December were £145.7 million, £1.4 million less than the record in the preceding month. December, however, contained one working day fewer than November, so that the daily rate of exports exceeded the November rate by 3 per cent. Re-exports were about £6.4 million. The provisional value of imports was £178.7 million, a decline of £2.3 million as compared with November. The apparent visible adverse balance in December was £26.5 million (a decrease of £2.2 million compared with November), and was the lowest for any month since January, 1947. The excess of imports had been reduced in each month since August, 1948, when the figure was £39.1 million. The total value of exports and re-exports for the year, on the basis of the monthly returns, was £1,648 million and of imports £2,080 million; for the second half of the year the figures of exports and re-exports were £873 million and of imports £1,054 million.

Task for 1949

Many industries had contributed to the expansion of exports. Among those which, by October and November, had already exceeded the monthly rates of export set as their end-1948 targets was machinery (including electrical machinery), with a monthly rate of £23 million. Electrical goods (£6½ million) were just below their target. One of our major tasks for the coming year was to expand our exports to hard currency markets, the most important of which were the United States and Canada, followed by Argentina, Belgium and Switzerland. Only in the case of Canada had there been a steady rise quarter by quarter since the middle of 1947; exports to Belgium and Switzerland had actually declined in recent months.

The steel industry had made an outstanding contribution to the general increase in industrial output in 1948. During the year the ingot target was raised from 14 to 14½ million tons, and in the event even the revised figure was surpassed by nearly 380,000 tons.

There had been a general expansion in the machinery-making trades, the increase over 1947 being somewhat higher than the increase in that year over 1946. Taking the annual rates for the first ten months and comparing with 1947, over £6 million worth more internal combustion engines were produced (totalling £26½ million worth), nearly £1 million worth more industrial furnaces (£5½ million worth), £5½ million more boilers (£29 million), £4 million more industrial valves (£13½ million), and £3 million more pumps and pumping plant (£14 million).

Since February last there had been a marked slowing down in the rise of retail prices, and dividend declarations had also been in line with the recommendation for stabilization. In the eight months from April to November the capital of companies which did not pay increased dividends amounted to 93 per cent of the total capital involved; and some of the small minority of companies which did vote increases had justifiable reasons for doing so.

Recording Transient Pressures

A SHORT paper was read before the London Students' Section of the I.E.E. last week by Mr. M. F. Cree dealing with the electrical methods of recording transient pressures, the measurement of which is becoming of increasing importance in engineering.

The author outlines the basic principles of pressure recording, following with a description of some practical applications, the equipment being considered in three parts, namely, the pressure head, recording apparatus and associated equipment. He describes several types of recording head, including those working on the principle of changing resistance, capacitance and inductance, together with piezo-electric units.

After mentioning some factors affecting the choice of recording apparatus, Mr. Cree concludes with a discussion on the methods of measurement and auxiliary circuit arrangements associated with different pressure heads.

Export Trade Information

B.O.T. CHANGES

WE recently reported changes in the Board of Trade organization dealing with export matters, involving the formation of a Commercial Relations and Exports Dept. (C.R.E.D.). The Board has now sent us some details of the organization and operation of the new arrangements.

The Department will be in three parts dealing respectively with countries or groups of countries (where the subordinate divisions are known as 'Country branches"); general matters; and industries.

Where general matters of export policy are concerned (of the kind that would usually interest the national trade associations) letters should normally be sent to the C.R.E.D. The same Department will also be primarily concerned with market prospects and information, marketing methods, agencies, advertising, etc. Where information is required about a particular country or group of countries the enquiry should be sent to the appropriate "Country branch." General selling prospects for a particular commodity and other matters not relating to a particular country will be handled by the Industries Branch of the Department, and this Branch will also deal with questions about agencies.

Questions affecting production and controls and export targets for particular industries should be referred to the appropriate Production Department, whether it is in the Board of Trade or in another Ministry.

Some matters will involve more than one Department, e.g., the volume of exports to be aimed at for a particular market. If a particular product or material is controlled or scarce it will be for the Production Department to deal with the matter. If it is a question of how much an overseas country can absorb the matter is one for the appropriate "Country branch" of the C.R.E.D. In any event, there will be full consultation between the Departments concerned. It is suggested that in many instances the approach to the Department is best made through the trade association to which the firm or individual belongs.

New Bulawayo Station

ULTIMATE CAPACITY 150,000 kW

IT was in June, 1898, that a public supply of electricity was first made available in Bulawayo which five years earlier had existed only as the chief kraal of the last of the Matabele kings, Lobengula. As the railway line did not reach Bulawayo until 1897, the earliest consignments of electrical machinery for the new undertaking had to be loaded into ox-wagons at Mafeking, 560 miles south, and the journey through the wild country, with the rivers often impassable during the rainy season, frequently occupied three months. Furthermore, in 1896 the country was struck by an epidemic of rinderpest of such severity that ox-transport had to be abandoned for a time.

In 1925 the undertaking passed into the control of the Municipal Council, and on 19th November last, fifty years after the inauguration of a supply, another milestone was reached in the official opening by the Governor of Southern Rhodesia (Maj. Gen. Sir John Noble Kennedy) of a large new generating station. Load development during the war was such that when a 10,000 kW set was installed at the original station (named after Chief Lobengula) in 1945 the extension came only just in time to avoid a complete breakdown in supplies. Last year a similar situation arose and consumers had to be asked to limit their demands.

The new 13th Avenue station is designed for a maximum capacity of 150,000 kW (two 15,000 and four 30,000 kW sets). It was decided to operate the station at a steam pressure of 600 lb/sq in and a temperature of 825 deg F, although at the time only two stations in Southern Africa were operating at this pressure. The engineering work in planning the mechanical and electrical sections of the project was carried out by the staff of the Electricity Department under Mr. J. W. Phillips in the initial stages and later Mr. A. R. Sibson, the present city electrical engineer. F. E. Kantback & Partners were employed as consulting engineers for the civil works.

The two 15,000-kW turbo-generators comprising the first section (one of which was commissioned at the opening ceremony) are of B.T.H. manufacture, with the condensing plant and its auxiliaries by Metropolitan-Vickers. Steam-raising plant consists of four Yarrow 80,000 lb/hr boilers. The main 11 kV switchgear and auxiliary gear is by A. Reyrolle.

The estimated cost of the first part of the station is £1,200,000.

COMMERCE and INDUSTRY

E.C.A. and Council Contracts: Electricity Information Service

AT a recent meeting of Bath City Council a letter was read in which the local branch of the National Electrical Contractors' Trading Association (an allied body of the Electrical Contractors' Association) complained that the Council was not adhering to a resolution passed last year that only members of the Association should be permitted to tender for the Council's electrical installation work. A tender had been accepted for certain housing estate work from a non-member.

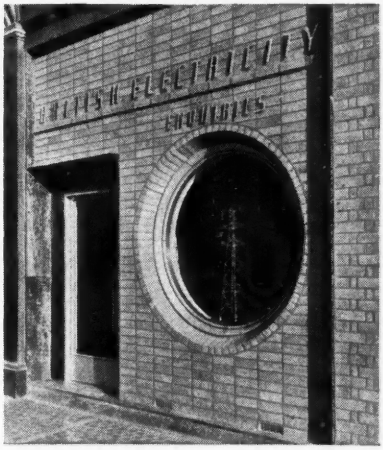
The Town Clerk explained that the resolution, passed on the recommendation of the Electricity Committee, was to the effect that the various committees should be recommended to invite and consider tenders from members of the Association. The chairman of the Housing Committee said that the resolution did not bind a committee in any way. The accepted tender was considerably lower than the next best. Another member regarded the price as too low. The Mayor said that the city engineer was satisfied with the decision; the members of the successful firm were working electricians and worked with their men.

The Committee's report was adopted without a dissentient vote.

B.E.A. Enquiry Bureau

The British Electricity Authority Enquiry Bureau, at 164, Great Portland Street, W.1, deals with telephone and in-person enquiries from members of the public, firms and other bodies connected with the industry, other outside bodies, and from within the industry itself.

The Bureau has some interesting architectural features. As far as possible controlled materials have been avoided, reliance for effect being placed on contrasts between marble, aluminium, fibrous plaster and veneers internally, and marble, aluminium and brick externally. The Great Portland Street elevation uses a specially selected Loughborough brick laid to a pattern, with green Tinos marble, and aluminium wire brushed and satin finished. The circular window frame is of cast aluminium in six sections; the doors are built up of extruded aluminium sections with handles turned from the solid metal; and the lettering is fret-cut from aluminium plate. The entrance lobby is lined with thin boards of figured English elm, this wood also being used for door linings and the bases of the fixed furniture. Lombardy elm veneer is used to line the walls, beige marble for the floor, with Lunel Rubane and Loupines marble for the low shelves which screen the banks of tubular heaters. A large wall map mounted on birds-eye maple veneer shows the boundaries of the fourteen Areas, and the location of the major power stations, whilst larger-scale maps of the Areas are housed in a map cabinet. Lighting is by fluorescent lamps in the stepped fibrous-plaster ceiling; and the heating is thermostatically controlled.



Exterior of the B.E.A. Enquiry Bureau

The architect was Mr. A. L. Osborne, F.R.I.B.A., and the heating and lighting installation was carried out by Troughton & Young, Ltd.

New Ulster Joint Board

The Northern Ireland Electricity Supply Industry Joint Board was inaugurated at a meeting in Belfast on 6th Jan. The following officers were appointed: Chairman, Mr. C. M. Cooper; vice-chairman, Mr. T. G. Christie, B.Sc., M.I.E.E., (chief engineer of the Electricity Board for Northern Ireland); joint secretaries, Messrs. R. A. Gracey and G. Millett, A.M.I.E.E.

At a luncheon which followed, the toast of "The Northern Ireland Joint Board" was proposed by Mr. G. W. Essex, A.M.I.E.E., deputy labour relations officer, British Electricity Authority. Mr. F. Lumby, M.I.E.E., national president of the Electrical Power Engineers' Association also spoke.

The new body became necessary as a re-

sult of the nationalization of the electricity supply industry in Great Britain. The District Joint Board for Northern Ireland, which had previously operated under the authority of and as a constituent member of the National Joint Board, thereby ceased to exist, and it became necessary that a new board having autonomous powers in Northern Ireland should be appointed.

Wholesaler's Display Van

An enterprising venture has been embarked upon by Ford Wholesale Electric, Ltd., of East Grinstead, to bring to the notice of its customers electrical equipment which it has available. The company has introduced an electrical show van, the interior of which has been fitted with shelves for the display of lighting fittings, domestic apparatus and accessories. This method of taking the display to the customer has already produced excellent results.

Display van of Ford Wholesale Electric, Ltd

Stand-by Works Generator

A 900 h.p. diesel engine driving a 600 kW generator has been installed at the Mitcham Works of Philips Electrical, Ltd., in a specially built power house. Night workers will be relieved for day duty by the provision of this equipment, as its output is about one quarter of daytime consumption. The diesel component was designed and used as one of a pair of propulsion units in a tank landing craft. It weighs well over 15 tons, and was purchased in the United States from General Motors, no suitable equipment being obtainable quickly in this country. The Philips Plant Department at Mitcham constructed all accessory equipment such as switchboard, control panels, cables and connectors and piping. For the storage of fuel a tank with a capacity of 28,000 gallons has been provided. Further stand-by power arrangements have been made at other factories of the Philips group. At Balham a capacity of 100 kW is provided, and at Brixton 60 kW.

Copper Alloys

All those associated with the engineering industries will find a great deal of useful information of a practical nature on copper and its alloys in a publication (No. 43) which is now available from the Copper Development Association, Kendalls Hall, Radlett, Herts.

It is in nine sections, describing in terms understandable to practical men the grades and alloys of copper and other metals, together with their electrical and mechanical properties. A series of tables classifies all of these materials according to the type of service for which they are suitable and an appendix furnishes a simple explanation of the metallurgy of copper and its alloys, indicating the changes which can be effected by heat treatment and how to use equilibrium diagrams.

This 88-page book, which is appropriately illustrated, is issued free of charge to all applicants giving evidence of responsible status or genuine interest in the subject.

Plessey Apprenticeship Scheme

The Plessey Co., Ltd., Ilford, has revised its apprenticeship scheme which is open to juveniles between the ages of sixteen and seventeen years without payment of a premium. The scheme provides for an extensive workshop training and technical education at the South-East Essex Technical College, which normally terminates when the apprentice reaches the age of twenty-one years.

Although intended primarily as a trade training course, apprentices who, by their progress, demonstrate their aptitude for technical occupations, will, when their indentures are endorsed at the age of eighteen, have courses of training laid out to qualify them as draughtsmen or technical assistants. Trades in which apprenticeship will be offered include engineering machinist, instrument maker, toolmaker, machine tool fitter and electrical tester. Candidates having their indentures endorsed for a trade will be expected to gain the ordinary National Certificate (Electrical or Mechanical), while apprentices who are drafted into technical departments for their last two years of training will be expected to

gain the Higher National Certificate (Electrical or Mechanical). Courses will normally commence in March and September of each year. A limited number of apprentices will also be taken as carpenters and joiners, maintenance fitters and sheet metal workers.

Engineering-Legal Society

Increasing attention has to be given by engineers in senior executive positions to legal questions. Consequently an Engineering-Legal Society has been formed; its membership will be open to those qualified in law or engineering and interested in the law as it affects engineering. Sir John Dalton is chairman, and the committee includes Messrs. R. Birt, C. L. G. Fairfield, E. J. Rimmer and H. E. Spicer, with Mr. R. Baldwin as hon. secretary.

The next meeting of the Society will be a dinner on 27th January, when an address will be given by Mr. G. P. Barnett, Chief Inspector of Factories, on "The Factories Act and the Engineer." Those who are interested in the new society are invited to communicate with Mr. R. Baldwin, c/o *Electrical Times*, Sardinia House, Sardinia Street, Kingsway, W.C.2.

Power for Textiles

A semi-private exhibition entitled "New Power for Textiles" opened this week at the Royal Exchange Restaurant, Manchester, and will remain open for approximately one month. It has been organized by Mirrlees, Bickerton & Day, Ltd., a subsidiary of Associated British Oil Engines, Ltd., in conjunction with other manufacturers, and with the co-operation of the Cotton Spinners' and Manufacturers' Association. The exhibition has been designed to demonstrate, by means of models, charts and illustrations, how diesel engines, with waste heat recovery equipment, can satisfy the present and future power requirements of the textile industry. A booklet, specially prepared for the exhibition, tells briefly the advantages and cost of installing diesel plant.

Mr. Hopkinson's Will

In his will, Mr. Robert Addy Hopkinson, former chairman and managing director of Hopkinsons, Ltd., who died in November, 1947, left the residue of his estate, after certain bequests, to trustees to form a fund for "the education of the people of this country in Socialist principles"; the trustees were prominent members of the Labour Party. In the High Court last week Lloyds Bank, Ltd., as executors of the will asked the Court to decide whether this was a valid charitable trust. Mr. Justice Vaisey held that although the object of the fund was quite a legitimate one he did not consider that political propaganda could be considered educational under the relevant Act; in other words, it was not "charitable."

The residuary legatees are the two sons and the daughter of the late Mr. Hopkinson.

Radio Interference

For the guidance of Members of Parliament when the House is considering the new Wireless Telegraphy Bill the Radio Industries Council has sent each member a copy of a memorandum on the subject of interference with radio. In simple terms this explains the ways in which interference is caused, the nature and extent of interference, and methods of suppressing it. The memorandum concludes with a brief statement of the benefits to be gained by legislation in this matter.

British Lamp Machine for America

An automatic machine for mounting electric lamp filaments, claimed to be the fastest of its kind in the world, designed and built by Thorn Electrical Industries, Ltd., at Enfield, Middx., is being shipped to New York in the record time of 22 months. The machine will be the first of its kind to be used in America where, despite the high degree of mechanization, it will perform at high speed operations previously done by hand.

A thousand separate blueprints were used in its construction, which involved 5,000 components, including some so small that a hundred would go comfortably into an ordinary thimble.

Ex-British Westinghouse Association

The annual reunion dinner of the ex-British Westinghouse Association will be held on 29th April at the Connaught Rooms, W.C.2, under the chairmanship of Mr. A. G. Ramsey.

Darkness into Daylight

Dr. J. N. Aldington is repeating his lecture on "Darkness into Daylight: 100 Years of Research and Development in Electric Light," on 8th February, at the City Hall, Newcastle-upon-Tyne. Tickets (free of charge) can be obtained from the North-Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne, or from Waddington & Sons, Ltd., Metrovick House, Northumberland Road, Newcastle.

Trade Announcements

Mr. L. F. Thorn has joined the staff of **F. Westerman (Wholesale), Ltd.**, as area sales supervisor, Radio and Domestic Appliances Department. Mr. Thorn, who has

served for twelve years with Midland Auto Components, is well known to the Midland trade and will continue to maintain contact in Birmingham, Northampton and districts.

The **British Thermostat Co., Ltd.,** has appointed Mr. V. C. Miles, 44, Southam Road, Hall Green, Birmingham, as its Midland representative for all of its products, and Mr. W. E. R. Langley, 35, Squires Bridge Road, Shepperton (telephone Chertsey 2091) as its sales representative for "Adaptastat" room thermostats.

The **Camley Engineering Co., Ltd.,** Leeds, has opened a London office and showroom at Roxburge House, 273-287, Regent Street, London, W.1. Mr. F. A. Gardner, late home sales manager of Boulton & Paul, Ltd., refrigeration division, has been appointed as southern manager in charge of the new offices.

From to-day (Friday), the address of **Allen & Pope, Ltd.,** will be 14, Shacklewell Lane, Dalston, London, E.8 (telephone: Clissold 6488).

Mr. S. Milner has been appointed manager of the new Acton branch of **Newey & Eyre, Ltd.,** which is being opened on 24th January at 243, Horn Lane, W.3. Mr. Milner was for some years chief electrical engineer at the Castle Bromwich factory of Vickers-Armstrongs, Ltd.

B.E.A. and A.P.L.E.

The Association of Public Lighting Engineers has been requested to grant corporate membership to the British Electricity Authority and the fourteen Area Electricity Boards. A minimum subscription for each Board is suggested, to cover the nomination of six representatives; additional members would be subject to arrangement.

N.W. Electricity Board Fined

The North Western Electricity Board was fined £20 at Barrow-in-Furness on Monday last following an accident last July when a workman received a 3,800V shock. The Board pleaded guilty to failing to safeguard high-voltage equipment in a transformer cubicle.

The workman, Thomas Hamilton, substation attendant, said he was cleaning the transformer when he slipped and his hand touched a bare terminal. He received a severe shock and burns and was taken to hospital.

A factory inspector, who prosecuted for the Ministry of Labour, said that regulations required that conductors should be insulated and effectively protected. There was no protection on the one which had been touched.

For the defence it was submitted that Hamilton had been told that his duties as a cleaner had nothing to do with live sections of the sub-station and he should have kept away from the transformer. The substation had been enlarged and the protecting screen over the bare terminals had not been replaced.

How to Save Electricity

The British Electrical Development Association has issued a handy little booklet containing hints and reminders of how electricity can be saved in the home and so made available for industry. Instructions are also given for reading electricity meters and space is provided for recording weekly meter readings.

B.R.A. Luncheon

The annual luncheon of the British Refrigeration Association is to take place at the Connaught Rooms, London, W.C.2, on 9th March. Lord Citrine, chairman of the British Electricity Authority, will be the principal guest.

Catalogues and Lists

Scophony, Ltd., Wells, Somerset.—Two leaflets on fractional h.p. motors and a home projector sound conversion kit.

Castelco (Great Britain), Ltd., Castle Works, High Street, Old Woking, Surrey.—Priced folder on pushbutton switches for table lamps, etc.

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Two folders, "Made to Music" and "XIV Olympiad," on public address systems.

Oliver Pell Control, Ltd., Cambridge Row, Burrage Road, London, S.E.18.—Priced folder illustrating a battery-operated door light.

M.K. Electric, Ltd., Edmonton, London, N.18.—Three priced leaflets describing a.c. tumbler, slot and ceiling switches.

Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1.—Leaflet on an electrically operated domestic butter making churn.

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Coheat" electric garden frame.

"Holm" electric hairdryers.

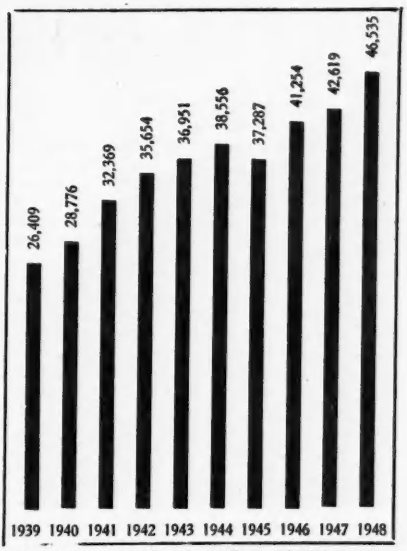
Generation in 1948

Rise of 9.1 Per Cent

DURING the year ended 31st December last 46,535 million kWh was generated for public supply by the British Electricity Authority, the North of Scotland Hydro-Electric Board and the Lochaber Power Co. This was 3,916 million kWh (9.1 per cent) more than in 1947. The rise in electricity production over the past decade is illustrated in the accompanying pillargraph; the only setback occurred at the end of the war, this being followed by increases of 10.6 and 3.2 per cent in 1946 and 1947 respectively.

The influence on electricity demand of the sunless weather experienced during much of last summer can be discerned in the monthly figures issued by the Ministry of Fuel and Power. From the 4,541 million kWh generated in January there was a regular seasonal decline until August (3,294 million kWh), but the summer "valley" was not so pronounced as in 1947. The year's highest rates of increase over the preceding year were in June and August (18.9 and 19.0 per cent), while the only two months in which output fell below the 1947 figures were January and March (decreases of 2.8 and 0.6 per cent).

At the end of December the installed capacity (m.c.r.) of generating plant was 13,226 MW compared with 12,729 MW at the close of the previous year, an increase of 497 MW (3.9 per cent). As explained last month, the installed capacity now excludes scrap plant or any other plant which has been disconnected and written off but not actually taken from the station. This has resulted in a slight reduction in the 1948 figure.



Electricity generation (in millions of kWh) during the past ten years

The statement also gives the output of solid-fuel-fired stations for the first week of 1949 (up to 7th January), namely, 1,026.3 million kWh, compared with 917.6 million in the preceding week and 914.8 million in the week ended 9th January, 1948. Stocks of coal at electricity undertakings at 8th January amounted to 3,720,500 tons.

	Fuel consumed Thousand tons		kWh generated millions			kWh sent out millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water power	Total†		
British Electricity Authority	2,773	3.7	4,505	56	4,578	4,323	12,900
North of Scotland*	21	1.0	32	82	118	117	326
Total for December, 1948	2,794	4.7	4,537	138	4,696	4,440	13,226
Total for December, 1947	2,700	5.3	4,315	104	4,437	4,195	12,729
Per cent increase or decrease ...	+3.5	−11.3	+5.1	+32.7	+5.8	+5.8	+3.9
Total for 1948	27,992	41.4	45,015	1,346	46,535	43,905	—
Total for 1947	25,987	52.5	41,330	1,128	42,619	40,192	—
Per cent increase or decrease on 1947 ...	+7.4	−21.2	+8.9	+19.3	+9.1	+9.2	—

* Including North of Scotland Hydro Electric Board and Lochaber Power Co.
† Including generation by other means amounting to 19.8 million kWh in December, 1948.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

Richard Crittall & Co., Ltd.—In a statement issued last week, Mr. R. G. Leach, the receiver and manager, and Mr. H. V. Cozens, the company's present chairman, outline the scheme of reconstruction of the company. The scheme provides for the continuation of the heating and ventilating business and for the liquidation or other disposal of certain subsidiary businesses and manufacturing activities. Fresh capital will be introduced by Industrial and Commercial Finance Corporation and by Securities Agency, who are providing a total of £300,000 in ordinary shares. For unsecured creditors, provision is made for a composition in cash of 4s 6d in the £. Holders of the existing £500,000 of 5 per cent £1 cumulative preference and £50,000 in 1s ordinary are faced with a total reduction in capital to £50,000. The new capital structure will consist of £350,000 in ordinary shares. After allowing for the £300,000 to be introduced, there is £50,000 of capital left for the preference and ordinary shareholders, who will be given an opportunity of disposing of the shares resulting from the reduction for cash at par. The committees appointed by the unsecured creditors and shareholders recommend the acceptance of the scheme.

The British Electricity Authority has decided not to exercise its option to repay British Electricity 3 per cent guaranteed stock 1948/53 on 1st May next. The original issue on 1st April, 1948, was for £587,900, of which £91,200 was repaid by drawings on 1st November last, leaving a balance of £496,700 outstanding.

Redfern's Rubber Works, Ltd., has announced that the usual half-yearly dividends will be paid on the "A" and "B" preference shares on 15th February but the final ordinary dividend will not be paid until after the annual meeting in March. It is proposed that in future preference and ordinary dividends be paid in March and September. An ordinary interim dividend of 5 per cent has been paid for 1948. In 1947 the interim dividend was the same and was followed by a final dividend of 5 per cent and a bonus of 7½ per cent.

New Companies

Croydon Cable Works, Ltd.—Registered 7th January. Capital £10. Manufacturers of and dealers in insulated cables and wires for the transmission of electrical energy, etc. Directors: T. H. Martin-Harvey (director of British Copper Refiners, Ltd., and other companies), D. Norman-Thomas, and J. P. Hourston (director of Commercial Secretaries, Ltd., and Electric Power & Communications Trust, Ltd.). Regd. office: Norfolk House, Norfolk Street, W.C.2.

Macintosh Cable Co., Ltd.—Registered 7th January. Capital £10. Objects and other particulars are similar to Croydon Cable Works, Ltd. (above).

Centrix Specialities, Ltd.—Registered 7th January. Capital, £5,000. Designers, inventors and manufacturers of and dealers in permutation switches for the ignition system of a motor vehicle and magnetic locks, and other locks and locking devices, electrical plant, machinery, plastics, plastic compounds, etc. Directors: C. V. Whale, E. D. Munday, W. A. J. Horne and Miss Margaret E. Horne. Regd. office: 118a, Kingston Road, Kingston-by-Sea, Southwick, Sussex.

C. H. Byron (Electrical), Ltd.—Registered 8th January. Capital, £8,000. To acquire the business of a manufacturer of and dealer in electrical and mechanical fittings, machinery and accessories carried on by E. V. Hudson at Smethwick. Directors: E. V. Hudson, J. B. S. Hudson, V. Hudson and J. M. Hudson. Regd. office: Contact works, Beakes Road, Smethwick.

Krivert, Ltd.—Registered 8th January. Capital, £100. Manufacturers of and dealers in electrical or mechanical goods, including domestic utensils, appliances and fittings, wireless and television goods, etc. Directors: O. Egert and O. Krivaczek. Regd. office: 4, Hope Road, Prestwich, Manchester.

Carlectrics, Ltd.—Registered 4th January. Capital £1,000. Manufacturers of and dealers in and agents for manufacturers of electrical and other equipment and accessories for motor vehicles, etc. Directors: W. Palmer and Mrs. Emily C. Evans. Regd. office: 63, Fortress Road, Kentish Town, N.W.5.

E. J. Schofield & Co., Ltd.—Registered 4th January. Capital £1,000. Manufacturers of and dealers in general electrical and radio fittings and accessories, refrigerators, etc. Directors: J. E. Schofield and T. Freer. Regd. office: 78, King Street, Manchester, 2.

Aberfoyle Industries, Ltd.—Regd. in Edinburgh 27th Dec. Capital £1,000. Electricians, electrical engineers and repairers, etc. Directors: A. D. Cameron and T. R. Gray Marshall.

Mandaw Company (1948), Ltd.—Regd. 31st Dec. Capital £100. Dealers in electrical and mechanical novelties and appliances,

manufacturers, importers and exporters of and dealers in electrical and mechanical goods and apparatus, wireless apparatus, etc. Directors: A. C. Adey and G. Meech. Regd. office: Bowmans Place, Holloway, N.7.

B.D.L. Dielectrics, Ltd.—Registered 7th January. Capital, £500. Manufacturers of and dealers in electrical equipment, appliances, apparatus and fittings, etc. Subscribers: W. G. Hare and B. C. Lazarus. Solicitors: Aukin Court & Co., 5, Queen Anne Street, W.1.

Secker & Sons (Norwich), Ltd.—Registered 6th January. Capital £6,000. To acquire the businesses of electrical and refrigeration engineers and electrical contractors heretofore carried on by W. H. Secker at 4, Hall Road, Norwich, and by D. D. S. Ellis and G. N. Roe at General Buildings, Riverside Road, Norwich. Directors: W. H. Secker, D. D. S. Ellis and G. N. Roe. Regd. office: 4, Hall Road, Norwich.

Brent & Salisbury, Ltd.—Registered 7th January. Capital, £1,000. Radio, electrical, electronic and television engineers, etc. Directors: C. Brent and M. J. Salisbury. Regd. office: 23, Victoria Street, Burnham-on-Sea.

Electro Refrigeration (Bradford), Ltd.—Registered 7th January. Capital, £1,000. Manufacturers of and dealers in refrigeration and cold-storage machinery, ice-cream plants, etc. Directors: J. McEvoy, K. Warnett and F. Hainsworth. Regd. office: Bell's Ironworks, Joseph Street, Bradford.

Increases of Capital

Tomlinson (Electric Vehicles), Ltd.—Increased by £13,000 in £1 ordinary shares, beyond the registered capital of £4,000.

Beck & Co. (Meters), Ltd.—Increased by £349,000 in 174,950 £1 5½ per cent cum. pref. shares and 349,900 10s ordinary shares, beyond the registered capital of £100.

Companies to be Struck Off Register

The names of the following companies will be struck off the Register at the expiration of three months from the dates shown unless cause is shown to the contrary:—

11th January.—East Horsley Radio Services, Ltd.; Electric Organs, Ltd.; Texa Electrical Co., Ltd.; Univolt Electric, Ltd.

14th January.—Smallwood Electrical, Ltd.

Bankruptcies

G. Clegg, residing at 14, Temple Square, Cheetham, Manchester, and formerly carrying on business at 250, Cheetham Hill Road, Manchester, under the style of George Arthur Clegg, electrical contractor. —Public examination 18th February at the Court House, Quay Street, Manchester.

A. Proctor, 6, Manor Close, Burton-on-Trent; **G. P. Harrold,** 81, Rowdale Road, Great Barr, Birmingham; and **E. Baxter,** 30, Rowdale Road, Great Barr, Birmingham, carrying on business in co-partnership at 51, High Street, Swadlincote, Derbyshire, under the style of Universal Sales & Services, radio and electrical distributors.—Receiving order made on 11th January, 1949, on debtors' own petition.

W. H. Tordoff, residing and carrying on business at 10, Burnett Avenue, Manchester Road, Bradford, electrical engineer.—Order made 10th December, 1948, suspending discharge for four weeks until 7th January, 1949.

J. A. Waghorn, 10, Sangora Road, London, S.W.11, and lately carrying on business at 91, Eccles Road, S.W.11, electrical engineer and contractor.—Trustee, Mr. A. E. Attwood, 90, Queen Street, Cheapside, London, E.C.4, appointed 31st December, 1948.

R. Hampson, Yew Tree Bungalow, Hallith'-Wood, Astley Bridge, Bolton, electrical engineer, and lately trading with A. Mearns as the Northern Supply Co. at 28, Victoria Square, Bolton, as electrical engineers.—First and final dividend of 20s in the £, and 4 per cent statutory interest, payable 31st January, at the Official Receiver's Office, 20, Byrom Street, Manchester.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month from 12th January: No. 651,904 (design). Class 9. Electrically operated pumps for aerating water in aquaria and for agitating chemical solutions; and thermostats.—Angel Electrical Industries, Ltd., Chelmsford Works, Chelmsford Road, Southgate, London, N.14.

KOLECTRIC.—No. 659,213. Class 9. Electric coils.—Armstrong Shock Absorbers, Ltd., Eastgate, Beverley, Yorks.

THE FLEM.—No. B 665,946. Class 11. Refrigerating apparatus, refrigerator condensers, electric fans, boilers (other than boilers being parts of machines), air and liquid filters (other than filters being parts of internal combustion engines), air conditioning apparatus and water softening apparatus.—Fleming Components, Ltd., African Chambers, 19, Old Hall Street, Liverpool, 3.

TENSITE.—No. 668,326. Class 17. Ceramic materials for electrical insulation.—George Wade & Son, Ltd., Manchester Pottery, High Street, Burslem, Stoke-on-Trent.

STOCKS and SHARES

"THERE is always something," the Stock Exchange says; which, being interpreted, means that there is usually some cause which acts in restraint of business and tends to depress rather than to invigorate markets. At this present juncture, the recent riots in Durban caused weakness in South African issues, mining and industrial alike. Other markets of the House, far removed from the seat of the Natal trouble, felt sympathetically the effect of the outbreaks. This week's reassembling of Parliament contributed to the dullness. Business has fallen into a quiet groove. New issues meet with varying kinds of reception, but good-class shares, particularly preference, command a ready circle of favour. Gilt-edged stocks hold their ground tolerably well; Transport Threes, for instance, are 100¾ and British Electricity 103⅛.

Electrical Equipment Shares

Much of the recent investment in the industrial market has continued to favour shares which would normally be associated with bonus or dividend possibilities. The limited market reaction to the latest official views on dividend prospects suggests that buyers are still content to wait for results and to accept, in the interval, a modest return. In the electrical equipment market, British Insulated Callender's ordinary set the pace so far as yield is concerned; at the buying price of 36s 3d the return is £3 13s per cent. Henley's and A.E.I. pay about 3¾ per cent. On General Electrics, Automatic Telephones and Cromptons the return is still appreciably below the 4 per cent mark. A glance at any of these companies' balance sheets and earnings is enough to explain this practical expression of confidence in their long-term prospects.

Capital Bonus Tax

At his press conference last week, the Chancellor refused to be drawn on the subject of the capital bonus tax. Falling as it does on the "bonus element" in a share issue, the tax adds substantially to the cost of issuing fresh capital to shareholders on terms attractive enough to assure support; and it virtually prohibits a company from capitalizing reserves with the blameless object of bringing nominal capital into line with the growth of assets and with money employed in the business. By itself, this procedure brings, of course, no tangible benefit to shareholders unless accompanied by a more liberal dividend policy and, as matters stand, removal of the tax would produce only nominal advantages so long as dividend limitation remains.

Dividend Limitation

In his replies to questions by the press, the Chancellor has snuffed most of such hopes as have lately been entertained about an early end to dividend limitation. It was last March when the F.B.I. signified industry's voluntary agreement to the principle, for the space of a year, as capital's contribution to the freezing of personal incomes. Sir Stafford now "envisages" that the agreement will continue. Questioned about the result of a failure by industry to prolong the agreement, Sir Stafford brought in a reference to legislation. These views had a mildly depressing effect on the industrial market, where a case for reprieve had been made out on the past year's wage increases.

Price Movements

American interest is reputed to be largely responsible for persistent animation in radio and television shares. Scophony 1s shares attract comment by maintaining a price little short of four times their par value. Radio Television ordinary are good at 7s 3d., after being higher; the preference are in demand up to 20s. Pye at 31s 3d are 3s up on the week. Ekco and E.M.I. are both better. Elsewhere, Associated British Engineering carried their spectacular rise to 82s before reacting to 79s; Brush are unchanged at 7s. Among overseas companies, there is very little business doing in Palestine on Jerusalem Electrics. The former's ordinary have changed hands around 27s 3d, which is about the price ruling before the latest crisis.

British Electric Traction deferred is 40 down on the week at 1905. Cable ordinary at 22o show a point loss. De la Rue have risen to 39s 6d, International Combustion to 47s 6d, Lancashire Dynamo to 5⅜, and Johnson & Phillips to 72s 6d.

Victoria Falls

News has yet to be made known of the price which holders of Victoria Falls & Power ordinary shares are to receive by way of payment for their interest in the company. Anticipation looked for some official announcement to be published before the end of last year, but, in the absence of news, the general impression remains that the price to be received will be somewhere in the neighbourhood of £7 12s 6d. To-day's market quotation is about half-a-crown below this, and the £1 preference shares, which are to be paid off at their par value, stand at 19s 6d.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

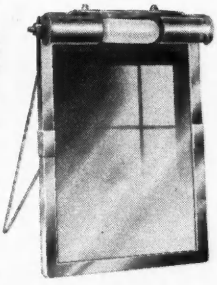
Clip-on Ammeter

A "CLIP-ON" ammeter designed for the measurement of currents from 5 to 800 A in a.c. or d.c. circuits without breaking the conductor is offered by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, under the proprietary name of "Clampmeter." It operates on the moving iron with a divided spring-hinged clamp which can be opened with one hand to enclose the cable under test. The instrument movement is self-contained in a moulded case and is plugged into the clamps, thus providing interchangeable ranges for movements calibrated with a particular clamp. Substantial insulation is provided and the instrument can be safely used on bare conductors at potentials of up to 600 V.

G.E.C. "Clampmeter"

Illuminated Mirror

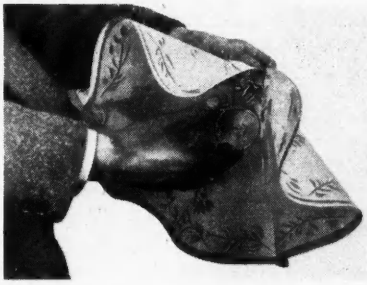
An illuminated mirror made by the MARLEY LIGHT CO., LTD., 3-5, Byron Road, Harrow, is equally suitable for dressing table or bathroom, being arranged for both standing or hanging. It is ideal for shaving or "make-up." Measuring 10in by 7in it consists of high-quality plate glass with metallized damp-proof back, in a chromium frame with a lamp at the top. The apparatus is supplied complete with lamp and three yards of three-core flexible wire. The price is £3 including purchase tax.



"Marley" illuminated mirror

Adjustable Lampshade

The "Klampshayd," a novel lampshade marketed by L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, Kingsway, London, W.C.2, can be used both for a pendant or table standard. It can be packed flat or rolled up for sending through the post and is assembled in a few seconds, an adjusting knob making it possible to alter the shape as desired. The 18in circle of plastic material which forms the shade is washable and practically unbreakable and is available in a large variety of attractive coloured pattern designs. The lampshade sells at 8s 11d.



The "Klampshayd"

Fluorescent Fitting

A 48in 40 W de-luxe fluorescent fitting introduced by SCEMCO, LTD., 6-7, Soho Street, London, W.1, is of stout gauge sheet steel, finished in white stoved enamel. The back plate and reflector cover are constructed separately to allow easy accessibility for installation or maintenance. All components are covered by a free replacement guarantee. The list price, including lamp, is 73s 6d, plus purchase tax on lamp 3s 3d.

Butter Churn

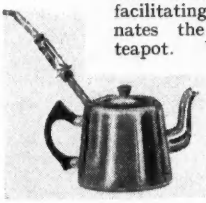
From 1½ to 3½ lbs of butter can be made in 8-10 minutes with a 6-quart electric butter churn made by J. J. BLOW, LTD., 229-231, High Holborn, London, W.C.1. The apparatus, which sells at £18 2s 6d,

J. J. Blow electric churn

including purchase tax, has a light alloy frame finished in cream cellulose enamel, the 1/20 h.p. induction motor and other moving parts being totally enclosed. The heater unit and container are instantly detachable. The total weight is 28lb.

Tea Kettle

The incorporation of a removable element in an electric kettle made by ELTRON (LONDON), LTD., Accrington Works, Strathmore Road, Croydon, besides facilitating cleaning, eliminates the need for another teapot. When removed the element may be used as a stirrer. The kettle holds six cups of tea. Its price is 28s 6d.



Eltron tea kettle

Kettle Element

A thermostatically controlled kettle element made by MERLIN MOULDINGS, LTD., 3, Central Parade, Catford, London, S.E.6, is suitable for replacement in any type of electric kettle. The thermostat operates at approximately 220 deg. C. and in a dry kettle takes only 30 seconds to open. The element, which is available with loadings of 1,000 W, 1,250 W and 1,500 W, is priced at 25s.

Merlin kettle element

Coffee Percolator

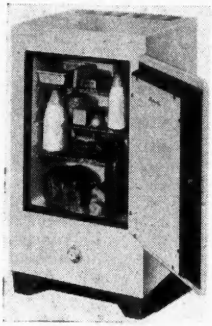
A draw-off tap is provided in the "Regent" coffee percolator made by ELECTRO TECHNICAL INDUSTRIES, LTD., 15, Islington Park Street, London, N.1. The body is of chromium-plated copper, with plastic handles, the lid having a "Pyrex" glass dome. The percolation unit consists of an aluminium tube and perforated coffee container. The 450 W heating element is contained in a black anodised aluminium cup and stand. A signal lamp shows when the apparatus is on circuit. The percolator, which has a capacity of 1½ pints, weighs 4lb and is 12 in high and 6¼ in. in diameter.

"Regent" coffee percolator

Another new percolator, the "Carlton," is similar to the "Regent," but has a spout and handle suitable for hand pouring. Both percolators sell at 77s 6d.

Absorption Type Refrigerators

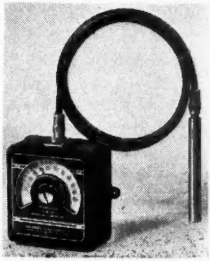
Hermetically sealed absorption units are employed in two new refrigerators made by BOULTON & PAUL, LTD., King Street House, Upper King Street, Norwich. Model 50, with a capacity of 2 cu ft and a shelf area of 3½ sq ft, measures overall 35in high, 22in wide and 21½in deep. Model 70, with a capacity of 3 cu ft and a shelf area of 5½ sq ft, is 41½in high, 23½in wide and 24½in deep. On both models the temperature of the food storage cabinet is thermostatically controlled and the door is fitted with a novel door handle and catch, and with an extruded rubber door seal and vitreous enamelled door liner. The outer cabinet is finished in white cellulose. The food storage cabinet is of vitreous enamelled steel and the ice trays and separator grids of anodized aluminium alloy, each tray has a capacity of 15 ice cubes. Adjustable shelves and a plastic driptray are provided. Model 50 is suitable for either a.c. or d.c., but model 70 is for a.c. only, a special relay being available however for use with d.c. when necessary. The smaller apparatus has a 130-W element, the larger 160 W. The price of model 50 is 45 guineas plus £13 1s 1d purchase tax, and that of model 70 55 guineas plus £15 19s purchase tax.



Model 70 Boulton & Paul refrigerator

Indicating Temperature Controller

The advantages of being able to observe temperature changes during a controlled process are readily apparent, this feature being provided by the "OZ" type indicating temperature controller which may now be obtained from the BRITISH

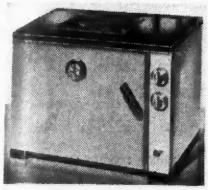


"OZ" indicating temperature controller

THERMOSTAT CO., LTD., Sunbury, Mdx. It is designed for standard temperature ranges up to 620° F and is normally supplied with a 5ft length of armoured capillary tube. The incorporated switch is of the snap action type and is capable of handling a.c. loads up to 15 A at 250 V or up to 4 kW at lower voltages, a relay being required for d.c. operation.

Table Cooker

For use in the small house or flat CLIFTON AIRCRAFT, LTD., Lytham, Lancs, have produced a table cooker with an oven large enough to accommodate, for example, a large joint and a pie. The actual cooking space is 13½in square by 13in, the overall



"Clifton" table cooker

dimensions of the whole unit being 22in by 18in by 15¾in. In addition to a 1,750 W Metrovick radiant hotplate, which can be used simultaneously for both boiling and grilling, there is a 1,200 W bottom oven element. The hob is sufficiently large to take three pans. The cooker, which is designed for plugging into a 15 A power point, is finished in black and cream vitreous enamel. The price of the cooker is £13 5s 6d. A cabinet-type stand to match is available for storing pans, cooking utensils, etc., for £2 5s extra.

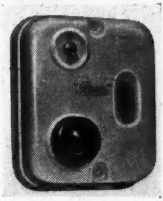
Chromium-plated Kettle

A chromium-plated aluminium electric kettle is an addition to the "Elephant" range of products made by BESCOL (ELECTRIC), LTD., Parkfield Road, Saltley, Birmingham, 8. It is similar to the polished aluminium and chromium-plated copper models and is also fitted with the company's patented thermostatically protected element. The retail price of the kettle is £3 11s.

Bescol "Elephant" kettle

Cooker Control Unit

A compact cooker control unit made by the REVO ELECTRIC CO., LTD., Tipton, Staffs, has a neatly designed case of pressed steel housing a 60 A, 250 V main switch and also a 15 A 250 V auxiliary circuit. The main switch has a double-pole micro-break movement and gives visible "on" and "off" indication for cooker control, while the auxiliary circuit comprises a double-pole kick switch, single-pole rewirable fuse and a 3-pin plug and socket for portable appliances. The whole of the interior components are mounted on a cast-iron base and are readily accessible when the cover is removed. The unit is provided with one 1in conduit clearance hole at the back and two ¾in or 1in conduit clearance holes drilled and tapped at top and bottom, two of these holes being provided with screwed plugs. The unit can be supplied either in cream stoved enamel or in grey mottled vitreous enamel.



Revo cooker control unit

Chokes and Transformers

A range of totally enclosed chokes and transformers, particularly suitable for use in industrial control gear, test apparatus and communications equipment, is now being made by the PLESSEY CO., LTD., Ilford, Essex. A high degree of standardization has been achieved in the design of the equipment, only five sizes of containers being used.

Arcolectric architectural lampholder

Architectural Lampholder

ARCOLECTRIC (SWITCHES), LTD., Central Avenue, West Molesey, Surrey, have recently started production on a new lampholder specially designed for architectural peg-cap lamps.

Stud Welding

In all industries where ferrous studs, pins and similar items have to be fixed to plates, girders, bars or tubes, time and money can be saved by employing the technique of electrical "stud" welding instead of more conventional methods. The basic principle of this method is to strike an arc between the end of the stud and the base metal, to produce a molten pool and raise the end of the stud to melting point. The arc is then extinguished and the stud driven into the pool to form a weld, the whole operation being performed with a "gun" in a fraction of a second. In this way and by using special studs and ceramic ferrules to

stabilize the arc, it is possible to make very high quality welds.

Equipment for this purpose is available from the Nelson Stud Welding Service, which has investigated and advised on problems of application. To facilitate further development and expansion of the service,

Nelson stud welding gun

it will be operated as from 1st January, 1949, by CROMPTON PARKINSON, LTD., Crompton House, Aldwych, London, W.C.2.

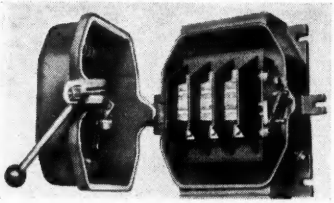
The equipment is designed for use by semi-skilled labour, is portable and built to withstand rough handling. The gun illustrated welds studs and pins of from 10 s.w.g. to ¾in diameter, weighs only 5 lb and may be operated with ease in any position particularly where space is limited. For quantity production it can be used as a hand tool or mounted in a fixture for repetition work. A number of guns can also be mounted together for multiple stud welding. Electric power is supplied from d.c. generator at about 60-90 V through leads which can be up to 300ft long. A separate timing unit in a portable case is also incorporated in the circuit for automatic circuit control of the weld cycle.

Iron Stand

A new type of electric iron stand made by MORPHY-RICHARDS, LTD., St. Mary Cray, Kent, is obtainable in primrose, pastel blue, pastel green and silver. The price is 4s 6d plus purchase tax.

Heavy-duty Fused Switches

A range of general purpose heavy-duty air-break switches for use in circuits carrying up to 400 A is offered by ROTORCON ELECTRICAL PRODUCTS, LTD., Rodsley Street, Old Kent Road, London, S.E.1. They operate on the rotary principle, incorporating a stationary fuse member and a double break per pole feature which ensures that the fuse and its attendant contacts are not "live" then the switch is in the off position. The switches of this type available at present are double-pole, triple-pole, triple-pole and neutral and four-pole.



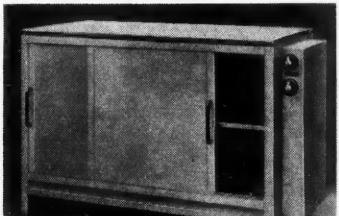
Rotorcon heavy-duty fused switch

Tubular Heaters

A range of tubular heaters made by the TYNAN-BYRD CO., and marketed by T-B PRODUCTIONS, The Malt House, Weedon, Northants, consists of four sizes, 3ft, 5ft, 7ft and 10ft. Special heat-resisting finish prevents rusting. The ½in bushed cable entry can be provided in either the end cap or at the side of the tube to order, while the fixing brackets are adjustable throughout the length of the tube.

Hotcupboards

Various improvements in appearance to meet present-day requirements have been incorporated in a range of hotcupboards redesigned by the ARORA COMPANY, Rosebery Street, Loughborough. Of robust welded steel construction these hotcupboards



Arora hotcupboard

have a dull nickel-plated top with aluminium enamel body. Four different sizes are available with tops measuring 36in, 48in, 60in and 72in, all by 24in, the respective loadings being 3 kW, 3.75 kW, 4 kW and 5 kW. Sliding doors are fitted except in the 36in size. Fully protected armoured safety type elements run the full length of the apparatus, which is drip- and spill-proof.

Direct-on Starter

A range of direct-on-line push-button motor starters fitted with thermal overload trips has recently been placed on the market by the AIREDALE ELECTRICAL & MANUFACTURING CO., LTD. They are housed in die-cast cases finished battleship grey and are available in five sizes for motors of from ⅛ to ½ h.p. with current ratings between 0.3 and 4.5 A.

Electricity Supply

Water Heating Load Control : Multi-Station Australian Scheme

Aberystwyth. — HYDRO - ELECTRIC DEVELOPMENT WELCOMED. — The District Planning Committee has expressed its approval of the British Electricity Authority's proposal for developing hydro-electric power in North Wales. It is to ask the County Planning Committee to consider requesting the B.E.A. to give priority to the Rheidol project.

Finchley.—SODIUM STREET LIGHTING.—The General Electric Co., Ltd., has recently supplied the complete equipment for a sodium street lighting installation to the borough for lighting Hampstead Lane. The lanterns are the company's Z.9425 type, with horizontally burning light source, and contain "Osram" 140 W sodium lamps. They are erected on 25ft steel columns at an average spacing of 120ft, giving an illumination of 5,100 lumens per 100ft of carriageway. In addition to the lanterns, lamps and columns, all the gear for operating the lamps was supplied by the G.E.C.

Gateshead.—STREET LIGHTING CONVERSION.—The Town Council has had an interview with the Ministry of Transport at which the Council's street lighting electrification scheme was considered. It was stated by the Ministry that it was most unlikely that the capital cost of £50,000 for the first and second stages of the scheme and for Carr Hill Road to the Trading Estate would be approved at present. The Ministry asked for details of the work and these are now being prepared. The Council has received sanction to borrow £4,280 for the provision of street lighting on housing estates.

Wallasey.—LOAD CONTROL EXPERIMENT.—Control relays are being experimentally installed by the Merseyside and North Wales Electricity Board in a number of houses to enable water heaters to be switched off at peak load periods. It is stated that several hundred Wallasey householders have already agreed to have the relays fitted.

Warwickshire.—PUBLIC INQUIRY SOUGHT.—Warwickshire Town and Country Planning Committee has decided to ask the Minister of Town and Country Planning to hold a public inquiry into a proposal of the British Electricity Authority to erect, at a cost of £11,500,000, a generating station at Hill Wootton, near Warwick. The site is within a few hundred yards of Guy's Cliffe, a beauty spot. Reporting upon the project, the Warwickshire Plans Sub-Committee state, "We need hardly say that we are greatly shocked by this proposal and consider that the County Council should oppose it by all legitimate means. The placing of such a station in the triangle between Warwick, Leamington and Kenilworth and within a few hundred yards of Guy's Cliffe is surely the very negation of good planning."

West Bridgford (Notts).—STREET LIGHTING.—The Urban District Council is to spend approximately £17,000 on street lighting. Sodium central lighting at a height of 25ft will be used for trunk and classified roads and bus routes.

Overseas

Australia.—LARGE WATER POWER PROJECT.—According to the Canberra Correspondent of *The Times*, special precautions are to be taken to protect the Snowy River hydro-electric project planned by the Commonwealth, Victorian, and New South Wales Governments from atom bombing and other forms of modern warfare. In most of the power stations many water channels will be underground. Mr. Chifley, in a broadcast, said that the scheme would cost between £100 million and £185 million. In addition to increasing areas under irrigation, the scheme will provide approximately 30 per cent more electric power than is at present used for all purposes in Victoria and new South Wales. The works needed for the scheme will be the largest ever undertaken in Australia and will take a generation to complete. Power will be produced by a large number of power stations which will require seven main dams, between 80 and 100 miles of tunnels through the Australian Alps and 500 miles of race lines.

Canada. — WINNIPEG RIVER SCHEME.—The Manitoba Government is to construct a dam and power plant on the Winnipeg River, about 70 miles north-east of Winnipeg, at an estimated cost of between $15,000,000 and $20,000,000. The project will not be completed until the autumn of 1952, but two of the six generating units will be in operation by the autumn of 1951. The total capacity of the plant will be 114,000 h.p.

Eire.—RURAL ELECTRIFICATION.—Recent months have been marked by remarkable progress in the extension of rural supplies. Since the first pole in this scheme was erected at Kilsallaghan, Co. Dublin, two years ago, 34,000 poles and 1,600 miles of

line have been constructed, the present rate of erection being 140 miles of line per month. Stocks of the materials required for the work are steadily accumulating, but progress is limited by erratic deliveries and shortages in certain cases.

Southern China.—WATER POWER FOR INDUSTRIAL EXPANSION.—Work is due to begin early this year on a hydro-electric scheme in the Wong Kiang area (Yung river) aimed at speeding up the industrial expansion of Northern Kwantung and opening the way to the development of the rich mineral resources of the province. Initial stages of the plan will cost, it is estimated, nearly $10,000,000. Plans have also been drawn up to build, in conjunction with the scheme, a series of dykes to control summer flood waters. The hydro-electric plant will have an initial capacity of 40,000 kW in two generators and later 80,000 kW in four sets. The Wong Kiang area was chosen for the scheme because of its natural resources. There are, for example, coal mines near Kukong and Yung Yuan, wolfram and copper ore deposits in Nam Hung, along the North Kwangtung border, and chromium and sulphur mines at Ying Tak and Tsing Yuan. The plant would also serve to open up new industries such as paper mills and cement factories.—*Reuters Trade Service.*

United States.—LARGE NEW DAM.—Preliminary work on a dam, in the Flathead Valley, is now under way. The dam (520ft high and 2,100ft long) will be the fifth biggest in the world, and will cost $100 million.

It will form a lake 34 miles long with a capacity of 3,500,000 acre-ft. The primary purpose of the dam is to provide electric power as part of a north-western power pool now being developed. Other aims of the project include irrigation and flood protection. The first power unit is expected to be in operation by 1951.

TRANSPORT

Darlington.—TROLLEY-BUS EXTENSION.—Paton & Baldwins, Ltd., are to pay half the cost of extending the Town Council's trolley-bus service along McMullen Road to the gates of the firm's new factory.

Italy.—POWER FOR ELECTRIC RAILWAYS.—The Railway Department of the Italian Transport Ministry has started the construction of three new hydro-electric stations—one in Alto Adige and two in Emilia, along the river Tanard—in order to meet the need for electric power for the country's railways. The construction of two other thermo-electric stations in Sicily is at present being examined. The Palermo-Trapani and Messina-Catania-Syracuse railway lines are shortly to be electrified at a cost of more than 32,000 million lire, according to the Italian Ministry of Communications. Electricity will be supplied by two new power stations, one at Messina (20,000 kW) and the other at Palermo (50,000 kW).—*Reuter.*

Manchester.—ABANDONMENT OF TRAMS COMPLETED.—On 10th January the chairman of the Transport Committee (Councillor A. T. Barratt) drove the Lord Mayor and members and officials of the Corporation on the last tram to be run in the city. Electric trams were first operated in Manchester in 1901.

Middlesbrough.—TROLLEY-BUS SERVICES.—The Tees Railless Traction Board is to apply to the Ministry of Transport for sanction to run trolley-buses on additional routes in the Eston area.

Newcastle-on-Tyne.—LOSS ON TROLLEY-BUSES.—During the year ended 31st March last, the city's trolley-bus undertaking made a loss of £5,224, compared with a surplus the previous year of £40,821. Income was £423,477 and working expenses £421,555 compared with £418,968 and £342,065 respectively the previous year. Other charges amounted to £7,146.

TROLLEY-BUSES REPLACE TRAMS.—The City Council has introduced trolley-buses on the Heaton Road tram route and the trams have been abandoned. The only trams now running in the city, apart from those operating over the Tyne to Gateshead, are on the Central Station—Scotswood Bridge service. These will be replaced as early as possible.

B.E.A. Training College

HADDON HALL HYDRO, Buxton, recently acquired by the British Electricity Authority, is to be used as a national college for specialist courses and staff conferences of the electricity supply industry. A minimum of necessary structural alteration is to be carried out immediately. The Hydro is also to be employed as a national training centre for young employees of the Area Boards and Generation Divisions in the North of England and South Scotland.

The Hydro consists of three intercommunicating blocks of buildings each of four floors. It contains 131 rooms, including seven public rooms and 82 bedrooms. On the ground floor there are four lounges each capable of accommodating from 40 to 50 people for lectures or discussions. The dining room is capable of seating 150 people and there is residential accommodation for up to 100 people, although the Hydro has in the past housed as many as 120 guests.

Next Week's Events

Monday, 24th January

BIRMINGHAM.—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Radio Group. "Television Developments," by Dr. K. R. G. Sturley.

BRISTOL.—Grand Hotel, 6 p.m. I.E.E. Western Utilization Group. "The Economical Utilization of Electricity in Great Britain," by R. B. Giles.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. informal meeting. Discussion on "Generation of Electricity by Gas Turbine Plant." Opened by L. J. Cheshire.

NEWCASTLE-ON-TYNE. — Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Electric Traction on the Southern Railway," by C. M. Cock.

NOTTINGHAM. — Corporation Gas Showroom, 6.30 p.m. Nottingham Society of Engineers. "Corrosion Fatigue in Power Plant," by A. H. Goodger.

Tuesday, 25th January

BIRMINGHAM.—Town Hall, 6 p.m. I.E.E. South Midland Centre. Faraday Lecture on "Television," by Sir Noel Ashbridge and H. Bishop.

COVENTRY. — Coventry Electric Club. "Light and Colour," by F. Jamison.

GLASGOW.—Royal Technical College, 7 p.m. I.E.E. Scottish Centre. "Centralized Ripple Control of High-Voltage Networks," by T. W. Ross and R. M. A. Smith.

LEEDS. — Yorkshire Electricity Board Offices, 1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Utilization Group. "The Flash Tube and its Applications," by Dr. J. N. Aldington and A. J. Meadowcroft.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. Discussion on "Improved Methods of Meter Testing." Opened by H. S. Petch.

Grosvenor House, Park Lane, 6.30 for 7 p.m. Electrical Contractors' Association. Annual dinner.

LOUGHBOROUGH.—The College, 6.30 p.m. I.E.E. East Midland Centre. "The Lightning Protection of High-Voltage Overhead Transmission and Distribution Systems," by H. M. Lacey.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Utilization Group. "Electrical Engineering Problems in the Tropics," by R. Allen (to be read by S. C. Wells).

Wednesday, 26th January

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "The Development of Magnetic-Tape Recorders," by E. M. Payne. (Joint meeting with Acoustics Groups of the Physical Society.)

I.E.E. London Students' Section, 2.15 p.m. Visit to H.M.T.S. *Monarch*, Greenwich. (Repeat on 29th January at 10 a.m.)

At the C.E.A., 164, Shaftesbury Avenue, W.C.2, 7 p.m. Television Society. "Television Transmission and Reception at 480 Mc/s.," by M. Morgan.

At the Institution of Civil Engineers, Great George Street, S.W.1, 6 p.m. Institute of Welding. The Sir William J. Larke Medal Paper.

STAFFORD.—English Electric Co.'s Association Hall, 7 p.m. I.E.E. South Midland Students' Section. "Thermostatic Controls," by R. S. Atkins.

Friday, 28th January

MANCHESTER.—Engineers' Club, Albert Square, 6.45 p.m. Manchester Association of Engineers. "Refrigeration as applied to Food Preservation," by A. B. Edwards.

Saturday, 29th January

HUDDERSFIELD.—I.E.E. North Midland Students' Section, 2.30 p.m. "Hydrogen Cooling of Rotating Electrical Machines," by D. F. Davidson.

I.E.E. Dinners

THE North-Western Centre of the Institution of Electrical Engineers is reviving its annual dinner, which will be held on 8th March at the Midland Hotel, Manchester. Mr. T. G. N. Haldane, the President of the Institution, will attend. Tickets (£1 each) can be obtained from Mr. A. L. Green, 244, Brantingham Road, Chorlton-cum-Hardy, Manchester,

The annual social function of the Scottish Centre of the Institution will take the form of a dinner and dance and will be held at the Grosvenor Restaurant, Gordon Street, Glasgow, on 9th February. Tickets are 30s, while members of the Students' Section, both students and graduates, may obtain special tickets for buffet dance only at 10s each. Applications should be made to Mr. C. S. Buyers, hon. secretary, 154, West George Street, Glasgow, C.2.

Electronics in Industry

A SPECIAL course of six lectures on "Electronics in Industry," will be given by Mr. L. I. Farren, a member of the staff of the Research Laboratories of the G.E.C., at the Polytechnic, Regent Street, London, W.1, on Fridays, commencing on 4th February. The fee for the course is 10s. and enrolment forms can be obtained from the Head of the Electrical Engineering Department.

Yorkshire Consultative Council

INAUGURAL MEETING AT LEEDS

AT Leeds last week the inaugural meeting of the Yorkshire Electricity Consultative Council was attended by members of the Yorkshire Electricity Board. The purpose of the Council is to maintain personal contact between the Board and the 1,000,000 Yorkshire electricity consumers, as well as to deal with other matters affecting distribution and tariffs. Its chairman, Ald. W. Leach, said that although the full organization to deal with local representation of consumers had yet to be settled, this would be done as quickly as possible. Consumers should feel they had as much right to approach local representatives with their grievances as to approach the local councillor on the electricity committee before nationalization. Consumers were expected, however, first to approach district managers, or local showrooms.

Mr. W. M. Lapper, chairman of the Yorkshire Electricity Board, explained that it was the Board's policy to maintain personal contact with consumers through its 62 showrooms where consumers with problems and complaints would receive sympathetic treatment. He gave some figures of the Board's working, stating that about fifty electricity undertakings had been taken over, and their annual consumption was 4,000 million kWh. Referring to load spreading he emphasized that it was not the desire of the Board to discourage the general use of electricity but only to discourage its use at peak load times. The Board was as keen as ever to sell electricity.

Mr. G. A. Vowles, B.E.A. divisional controller for Yorkshire, gave particulars of the availability of generating plant in relation to consumers' demands. Referring to the Authority's programme of construction up to the winter of 1952, he said that 737,500 kW of plant would be installed for the Yorkshire Division, whilst it was planned for the winter of 1953-54 to install a further 135,000 kW. Everything possible was being done to preserve the amenities of those who were compelled to live within short distances of power stations, and several hundred thousands of pounds would be spent in the Yorkshire Division to minimize the nuisance.

Electricity in Canada

EXHIBITION WINNER'S TOUR

A PAPER entitled "Canada's Electricity" was read by Miss Dorothy Taylor at the Institution of Electrical Engineers on 14th January last. Miss Taylor, who has recently returned from Canada, where she has made a tour of the electricity undertakings as the winner of the third Travelling Exhibition of the Caroline Haslett Trust, said that there were various methods of selling electricity in Canada, but on the whole, the tariffs were straightforward and comparatively simple. The 3- or 4-block method of charging was favoured, and in some cases excessive consumption was checked by making the fourth block dearer than the third.

The demand for most electrical appliances far exceeded the supply. At the end of December, 1947, there were over two million wired homes, and of these 23 per cent had electric cookers, 32 per cent had refrigerators, 61 per cent electric washing machines, 90 per cent had electric toasters, and 100 per cent electric irons. Out of twelve companies and Power Commissions, only seven sold electrical apparatus. The policy was to stop merchandising anything which no longer needed sales promotion and there was no competition with dealers at all. Interesting features of the policy of the British Columbia Electric Co. were its advisory services, which included wiring and lighting, a home service department, a home service kitchen, where testing was done and consumers' cooking problems were dealt with, and a "dealer services" department.

Most companies and commissions seemed to have managed to keep ahead of the demand for electricity by anticipating the needs of the various classes of consumers and planning development schemes accordingly. In Ontario there was a shortage of generating plant and there were power cuts, but consumers were notified in the morning papers the exact time that power would be cut, and also the duration of the cut. Miss Taylor concluded with some details of welfare activities of Canadian electricity undertakings.

Mr. C. T. Melling, chairman of the Eastern Electricity Board, presided at the meeting and the Dowager Lady Swaythling, president of the Electrical Association for Women, expressed thanks to the speaker and the chairman.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

BRITISH Thomson-Houston Co., Ltd. (General Electric Co.).—"Ignition spark-gap devices." 15996. 22nd August, 1944. (614906.)

1945

General Electric Co., Ltd., and J. Cates.—"Circuits for electric-discharge lamps." 3693. 14th February, 1945. (614911.)

Soc. Gramme.—"Electrically-driven road vehicles." 10266. 30th August, 1941. (614914.)

British Thomson-Houston Co. Ltd.—"Electric control systems." 21247. 19th August, 1944. (614918.)

A. H. Stevens (Paraphone Hearing Aid, Inc.).—"Hearing aid apparatus." 23087. 7th September, 1945. (615104.)

1946

British Thomson-Houston Co., Ltd.—"Electronic control circuits." 9427. 31st March 1945. (614933.)

Philips Lamps, Ltd.—"Sliding-core inductance coils." 12978. 28th January, 1942. (614704.)

Marconi's Wireless Telegraph Co., Ltd.—"Indicators for use with rotatable shafts." 12th May, 1945. (614939.)

Radio-Industrie Soc. Anon.—"Methods of and means for producing modulating signals for television transmitters." 15500. 23rd May, 1945. (614942.)

Standard Telephones & Cables, Ltd.—"Manufacture of Electrical dry-contact rectifiers." 15823. 28th May, 1945. (614943.)

Cathodeon, Ltd., and G. B. F. Goff.—"Image-producing screens for cathode-ray tubes." 16673. 31st May, 1946. (614947.)

S. Smith & Sons (England) Ltd., and J. W. Ellis.—"Clock-controlled electric switch gear." 17254. 6th June, 1946. (614949.)

C. A. G. Le May and P. E. Halstead.—"Electric thermometer circuit." 19044. 26th June, 1946. (614952.)

British Thomson-Houston Co., Ltd.—"Arrangement for the recording of the temperature of the windings of oil-immersed electrical apparatus." 21155. 16th July, 1945. (614961.)

R. C. De Holzer.—"Inductors or transformers." 21517. 18th July, 1946. (614964.)

Sperry Gyroscope Co., Inc.—"Induction generators." 21721. 31st July, 1945. (614707.)

R. E. Thompson & Co. (Sunbury), Ltd. and J. B. Andrews.—"Thermostatic-electric switches and snap-action mechanism therefor." 21795. 22nd July, 1946. (614717.)

General Electric Co., Ltd., and M. M. Levy. "Electric filter circuits." 21825. 22nd July, 1946. (614720.)

E. Perkins & Co., Ltd., and E. G. Perkins.—"Contact pins for electric couplings." 21875. 23rd July, 1946. (614728.)

Philips Lamps, Ltd.—"Circuit for connecting a two-wire line to wireless transmitting and receiving channels." 21886. 15th March, 1943. (614729.)

Mallory Metallurgical Products, Ltd., and N. A. Tucker.—"Trimming of the operating faces of workpieces such as electrodes." 21916. 23rd July, 1946. (614734.)

British Thomson-Houston Co., Ltd.—"One-way drives and detents with magnetic locking." 21948. 24th July, 1945. (614738.)

W. T. Glover & Co., Ltd., and E. L. Davey.—"Electric cables." 21968. 23rd July, 1946. (Cognate application 30196/46.) 614744.)

British Boiler Accessories, Ltd., and E. Mahler.—"Sludge separating apparatus for steam boilers and the like." 21985. 24th July, 1946. (614745.)

Philips Lamps, Ltd.—"Devices for the oscillographic indication or recording of electrical or mechanical processes." 22003. 13th January, 1940. (614748.) "Devices for generating impulse voltages." 22006. 20th October, 1942. (614749.)

Marconi's Wireless Telegraph Co., Ltd.—"Radio-frequency inductances and tuners." 22017. 24th July, 1945. (615106.)

A. Spencer and G. Good.—"A.C. supply systems for electric clocks, and like frequency dependent apparatus." 22041. 24th July, 1946. (614751.)

British Thomson-Houston Co., Ltd.—"Cleaning and electro-plating processes." 22077. 31st July, 1945. (615110.)

J. A. C. Malchus.—"Winding of commutator matches." 22103. 6th March, 1943. (614970.)

Marconi's Wireless Telegraph Co., Ltd.—"Cathode-beam tubes." 22109. 24th July, 1945. (615113.)

Aktiebolaget Hakanssons Industrier.—"Electromagnetic interrupters." 22188. 1st August, 1945. (615118.)

Neonelectric Co., Ltd., and R. J. B. Morgan.—"Electric thermal switches operated by glow-discharge." 22220. 25th July, 1946. (614754.)

A. Burli.—"Clamp for electric conductors." 22225. 21st November, 1945. (615121.)

General Electric Co., Ltd., R. L. Breadner and C. H. Simms.—"Methods of manufacturing glass beads and the like." 22305. 26th July, 1946. (614979.)

M-O Valve Co., Ltd., L. R. E. Windsor, E. G. Rowe and G. V. H. Freeman.—"Thermionic tubes and other electron discharge devices and holders therefor." 22306. 26th July, 1946. (Cognate application 25222/46.) (615126.)

Carr Fastener Co., Ltd., and C. W. Heath.—"Electrical contacts for receiving terminal pins or plugs." 22311. 6th July, 1946. (614764.)

A. Rodel.—"Forehead lamps, particularly for medical purposes. 22312. 26th July, 1945. (614765.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—"Electrical switch contact devices, more particularly relays." 22318. 19th October, 1942. (614980.)

Standard Telephones & Cables, Ltd.—"Electrolytic corrosion control systems." 22356. 13th August, 1945. (614768.) "Insulated electric cable and insulation therefor." 22357. 4th August, 1945. (615131.)

British Thomson-Houston Co., Ltd., and H. de B. Knight.—"Hermetically sealed spark-gaps." 22363. 26th July, 1946. (614769.)

S. G. Dehn (Minneapolis-Moline Power Implement Co.).—"Electric circuit controller." 22438. 27th July, 1946. (614985.)

B. H. Levine-Williams.—"Electric welding apparatus." 22480. 29th July, 1946. (615141.)

General Electric Co., Ltd., and H. M. Nelson.—"Eddy-current heating." 22541. 29th July, 1946. (Cognate application 37131/46.) (615150.)

British Thomson-Houston Co., Ltd., V. A. Higgs and L. Griffiths.—"Generators for motor-cycles or the like." 22552. 29th July, 1946. (614783.)

R. C. Vaughan.—"Miniature electric motors." 22670. 30th July, 1946. (615160.)

British Thomson-Houston Co., Ltd.—"Electric switches." 22706. 31st July, 1945. (614798.)

General Electric Co., Ltd., and M. M. Levy.—"Modulation of electric pulses." 22823. 31st July, 1946. (614805.)

General Electric Co., Ltd., and L. M. King-Brewster.—"Electric condensers." 22827. 31st July, 1946. (614806.)

D. C. Beer.—"Snap-action electric switches." 22905. 1st August, 1946. (614812.)

Philips Lamps, Ltd.—"Circuit arrangement comprising a secondary electron-emission tube." 22923. 30th May, 1940. (614813.) "Electric incandescent lamps." 22929. 6th October, 1942. (614814.) "Chisel, stylus and like members for mechanically recording or reproducing oscillation records." 22932. 4th March, 1943. (614815.)

Sperry Gyroscope Co., Inc.—"Frequency multipliers utilising electron-velocity-modulation." 22996. 9th August, 1945. (614822.)

U. Sabatini and V. Ciampolini.—"Push-button electric circuit-breakers." 23079. 18th January, 1946. (615187.)

Standard Telephones & Cables, Ltd.—"Wide-band voltage probe." 23101. 30th October, 1945. (615189.)

British Thomson-Houston Co., Ltd.—"X-ray generators." 23131. 8th February, 1943. (614833.) "Fluorescent materials." 23132. 2nd August, 1945. (61591.)

General Electric Co., Ltd., and B. Shaw.—"Retarding mechanisms." 23143. 2nd August, 1946. (614834.)

Akt.-Ges. Brown, Boveri & Cie.—"Operation of gas turbine installations." 23242. 6th June, 1946. (614846.)

Tetra Engineering Co., Ltd., and E. Stern.—"Cut-outs for electrically heated devices." 23348. 6th August, 1946. (614858.)

Ward & Goldstone, Ltd., and W. H. Willett.—"Electric battery torches." 23372. 7th August, 1946. (614,857.)

R. A. Smith and F. Young.—"Holding devices for electric lamps." 23375. 7th August, 1946. (614858.)

Philips Lamps, Ltd.—"Method and apparatus for electrically heating materials." 23426. 16th January, 1940. (614861.)

Pirelli-General Cable Works, Ltd., and R. J. Jordan.—"Overhead electric cable power transmission systems." 23436. 7th August, 1946. (614862.)

Walsall Conduits, Ltd., and E. Gough.—"Plug-and-socket connectors for electric circuits." 23489. 8th August, 1946. (Cognate application 2394/47.) (614864.)

W. H. Blake (Mefina Soc. Anon.).—"Devices for securing an element of an oscillating electric circuit to a support." 23493. 8th August, 1946. (614866.)

British Thomson-Houston Co., Ltd., and F. D. Lester.—"Control of compound motors used for rheostatic braking in electric traction systems." 23536. 8th August, 1946. (614869.)

Chloride Electrical Storage Co.. Ltd. (H. C. Riggs).—"Electric storage batteries." 23640. 9th August, 1946. (614874.)

Westinghouse Electric International Co.—"Dielectric heating." 23666. 10th August, 1945. (614875.)

British Thomson-Houston Co., Ltd., and R. Keitley.—"Capacitance dividers for use at ultra-high-frequencies." 23703. 9th August, 1946. (614879.)

General Electric Co., Ltd., and E. H. Croft.—"Electric protective arrangements." 23837. 12th August, 1946. (614889.)

G. Taylor.—"Rotary electric selector switches." 23843. 12th August, 1946. (614890.)

Western Electric Co., Inc.—"Electromagnetic relays" 23857. 7th September, 1945. (614892.)

Scophony, Ltd., and G. Wikkenhauser.—"Electro-discharge lamps. 23942. 12th August, 1946. (614896.)

Pye, Ltd., and H. C. Durrant.—"Electric terminal connectors." 23908. 12th August, 1946. (614897.)

Philips Lamps, Ltd.—"Regulating apparatus for alternating-current voltages in connection with the charging of batteries." 24006. 25th May, 1940. (614903.)

R. Glommen.—"Connection means for electric cables especially designed for welding cables." 24057. 13th December, 1945. (615010.)

Walsall Conduits, Ltd., and R. A. B. Court.—"Movable covers for flush-mounted electrical devices." 24079. 14th August, 1946. (615013.)

General Electric Co., Ltd., and R. C. Moore.—"Cathode-ray tubes." 24158. 14th August, 1946. (615016.)

British Thomson-Houston Co., Ltd., and J. Moir.—"Two-conductor signal transmission lines." 24262. 15th August, 1946. (615021.)

A. Reyrolle & Co., Ltd., and R. W. Wild.—"Air-break circuit-breakers having arc chutes." 24372. 16th August, 1946. (615025.)

Westinghouse Brake & Signal Co., Ltd.—"Electro-pneumatic braking apparatus for railway vehicles and the like." 24380. 20th May, 1942. (615028.)

Etablissements Merlin & Gerin.—"Operating means for gas-blast electric switches." 24387. 4th December, 1942. (615030.) "Gaseous fluid-blast electric switches." 24388. 5th May, 1939. (615031.)

Simms Motor Units, Ltd., and W. Bryan.—"Magnetic cleaners for liquids." 24436. 16th August, 1946. (615033.)

M-O Valve Co., Ltd., and W. Macrae.—"Split-anode magnetrons." 24493. 16th August, 1946. (615034.)

Mond Nickel Co., Ltd.—"Electro deposition of nickel." 24512. 6th September, 1945. (615036.)

British Thomson-Houston Co., Ltd.—"Electric induction apparatus." 24660. 21st August, 1945. (615044.)

Sulzer Freres Soc. Anon.—"Elecrically propelled vehicles." 24787. 12th June, 1946. (615052.)

British Thomson-Houston Co., Ltd., and J. H. Walker.—"Windings of dynamo-electric machines." 21st August, 1946. (615058.)

Etablissements Merlin & Gerin.—"Gas-blast electric switches having one or more tubular contacts." 24923. 24th February, 1944. (615059.)

G. D. Olsson.—"Electromagnetic relays." 24950. 30th August, 1945. (615062.)

Dorman & Smith, Ltd., and J. Lund.—"Means for mounting fuses in electric circuits." 25044. 22nd August, 1946. (615067.)

Dulrae Patents, Ltd., J. L. Musgrave, and W. H. Steele.—"Electrical heating elements." 25064. 22nd August, 1946. (615069.)

British Thomson-Houston Co., Ltd., and A. A. Pollack.—"Commutators for dynamo-electric machines." 25102. 22nd August, 1946. (615070.)

H. D. Wheeler and P. A. H. Mossay.—"Electrically operated rolling mill systems or equipment." 25117. 22nd August, 1946. (615071.)

British Broadcasting Corporation and R. H. Hammans.—"Frequency modulation of radio signals." 25138. 22nd August, 1946. (615073.)

Standard Telephones & Cables, Ltd.—"Eletctric battery charging system." 25226. 1st September, 1945. (615081.)

Cinch Manufacturing Corporation.—"Mountings for electrical tube sockets and the like." 25233. 18th September, 1945. (615082.)

British Thomson-Houston Co., Ltd.—"Time delay devices suitable for electric switches. 25244. 24th August, 1945. (615083.)

Johnson & Phillips, Ltd., and W. J. Welsh.—"Stripping devices for cables." 25445. 26th August, 1946. (615099.)

General Electric Co,. Ltd., S. S. Beggs, and W. R. Stevens.—"Spot lights and the like." 25457. 26th August, 1946. (615101.)

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A. Taylor and R. Reith.—"Electrically heated water circulating systems." 14011. 12th June, 1947. (614803.)

Summer School Proceedings

IT will be remembered that in July, 1948, a most successful Summer School in electrical engineering was held by the British Thomson-Houston Co., Ltd., at Rugby. It was attended by some forty engineers and academicians, including no fewer than 17 professors, and the company's engineers lectured on a wide range of subjects relevant to modern electrical engineering.

It is announced that the proceedings of this School have now been published by the company, for a limited circulation only, in the form of an extremely well-produced book containing some 176 pages. The subject matter records 26 lectures covering essentially the most up-to-date aspects of electrical engineering, thus making the work a virtual text-book of an advanced nature which will doubtless be of great technical and educational value. The book is well printed on good quality paper, contains an abundance of photographic reproductions and is altogether worthy of the information it contains.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Altrincham.—5th February. Corporation. Installation of street lighting. (See this issue.)

Argentina.—BUENOS AIRES.—15th February. Directorate General of Water and Electric Power. Material for 66 kV transmission line. (E.P.D. 44073/48. Ten/132.)*

Belfast.—4th February. Electricity Department. Electrical materials. (14th January.)

Crayford.—7th February. U.D.C. Stage lighting equipment for Town Hall. (See this issue.)

East Retford.—4th February. Borough Council. Two sets of electrically driven pumping plant for Hallcroft pumping station. Borough surveyor, Municipal Offices, The Square.

Glossop.—8th February. Corporation. Electrical installation, Market Hall. (See this issue.)

Gosport.—2nd February. Borough Council. Electrical goods for one year to 31st March, 1950. Borough engineer, Town Hall.

Huyton-with-Roby.—5th February. U.D.C. Electric cables and flexes, electric lamps, and electrical sundries for one year from 1st April, 1949. H. K. Pilkington, surveyor, Council Offices.

Kent.—Firms wishing to be included in the County Council's lists of contractors for electrical engineering works are invited to submit applications. (14th January.)

Uruguay. — MONTEVIDEO. — 16th February. Usinas Electricas y Telefonos del Estado. Four 1,500 kW generating sets. (C.R.E. 152/49. Ten/136.)*

*** Specifications may be inspected at the Commercial Relations and Exports Department, Thames House North, Millbank, S.W.1.**

Orders Placed

London.—L.C.C. Accepted. Electrical installation at the Charles Dickens School, Southwark.—Reliance Electrical Co.

South Africa.—Department of Posts and Telegraphs. 2.8-kVA automatic starting lighting sets.—Arthur Lyon & Co. (Engineers), Ltd., Acton, London, W.3.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abingdon.—Houses (36), Fitzharris site; F. Russell Cox, architect, Blanket Hall, Witney.

Avonmouth.—Factory (£1,000,000), Chittening estate; Head Wrightson Processes, Ltd., 24, Baltic Street, London, E.C.1.

Bexhill.—Houses (100), Ninfield Road estate; borough engineer.

Bishop Auckland.—Developments at General Hospital (£30,000); Newcastle Hospital Board, Osborne Road, Newcastle-on-Tyne.

Houses (1,250), Woodhouse Close estate; U.D.C. surveyor.

Buckinghamshire.—Secondary modern school, Stoke Road, Slough; G. R. Crouch, county architect, County Hall, Aylesbury.

Camborne.—Nurses' home and new male wards, Tehidy Sanatorium, for South-Western Regional Hospital Board; Sydney Gregson, county architect, County Hall, Truro.

Cardiff.—Large Government offices, Heath estate; Ministry of Works, 43, Park Place.

Coventry.—Works and offices, Torrington Avenue; R. Jack (Hosiery), Ltd., Mile Lane, Quinton Road.

Dagenham.—Cardboard box factory, Dock estate; C. Davidson & Son, Bucksburn, Aberdeen.

Darlington.—Houses (29) at Middleton-St. George for the R.D.C.; J. F. Sweeten, architect, Conisclifle Road, Darlington.

Daventry.—Factory, Fawley Road; Edgar J. Saxon, Ltd., 314, Uxbridge Road, London, W.3.

Devon.—Technical college, Barnstaple; H. V. de Courcy Hague, county architect, 97, Heavitree Road, Exeter.

Doncaster.—Factory on four-acre site, Wheatley estate; P. Platts & Sons, Ltd., agricultural engineers, 13, Market Place.

Dudley.—Dwellings (338), Old Park Farm estate; borough engineer.

Durham.—Houses (250); R.D.C. surveyor, Byland Lodge, Durham.

Ealing.—Block of offices, Uxbridge Road; P. Caspari, architect, 7, Abercorn Mews, Violet Hill, N.W.8.

Eastbourne.—Flats, Bourne Street; borough engineer.

Bakery, dairy, laundry, etc., Lottbridge Drove; Co-operative Wholesale Society, Ltd., 99, Leman Street, E.1.

Edinburgh.—Dormitories, etc., at Leith Sailors' Home (£27,000); British Sailors' Society, Inc., 680, Commercial Road, London.

Additional block of offices at 7, George Street (£75,000); manager, Standard Life Assurance Co.

Essex.—Secondary school for county E.C.: Chingford (£175,000); Taylor Woodrow Construction Co., Ltd., builders, Southall.

Saffron Walden (£250,000); F. G. Minter, Ltd., builders, Putney, S.W.15.

Fareham.—Houses (72), Winnards Copse site; U.D.C. engineer and surveyor.

Felling-on-Tyne.—Houses (80) for the U.D.C.; housing architect, Council Offices.

Gateshead.—Bakery, Hawks Road, for Laws Stores, Ltd.; A. H. Fennell, architect, Bridge End Chambers, Chester-le-Street.

Houses and flats, Lyndhurst estate, for the T.C. Builders: E. Jeffcock, Ltd., New Bridge Street, Newcastle-on-Tyne (51 houses); J. Clark & Son, New Seaham (54 houses and 36 flats); Clerey & Son, Frederick Street, Sunderland (40 houses); and J. H. Fisher & Co., Kenton Lane, Newcastle (38 houses).

Gloucestershire.—Police stations, Hardwicke, Bisley, Chalford Hill and Painswick; county architect, Shire Hall, Gloucester.

Grantham.—Two hostel blocks, gymnasium, etc., at Teachers' Training College; L. D. Tomlinson, architect, Quadrant Arcade Chambers, Romford.

Hamilton.—Houses (130) for Scottish Special Housing Association; secretary of the association, Edinburgh.

Harefield.—Extensions to nurses' home at Harefield Hospital (£45,000); North-West Metropolitan Regional Hospital Board, 11a, Portland Place, W.1.

Hull.—Rebuilding Ferensway House (office block); city architect.

Ilford.—Houses (90), Torquay Gardens and Falmouth Gardens; T. A. Clark (Ilford), Ltd., 26, Roding Lane.

Isleworth.—Out-patients' department, diet kitchen, etc., West Middlesex County Hospital; North-West Metropolitan Regional Hospital Board, 11a, Portland Place, W.1.

Keighley.—Junior school, Guardhouse estate; borough architect, College Street.

Leeds.—Dormitory block additions, Thorp Arch Grange Approved School; city architect, Priestley House, Quarry Hill, Leeds, 9.

Leicester.—Junior and infants' school, Charnor Road; J. H. Lloyd Owen, architect, 7, Newarke Street.

Leith.—Cold storage and boot repairing departments, Bangor Road (£180,000); Leith Provident Co-operative Society, Ltd.

London.—Stoke Newington.—Two three-storey and one six-storey blocks of flats, Green Lanes; Howes & Jackman, architects, 1, Verulam Buildings, W.C.1.

Luton.—Primary schools and secondary school; borough engineer.

Lydd.—Houses (32); Culpin & Son, architects, 3, Southampton Place, W.C.1.

Montgomery.—Primary school, Abermule; county architect, County Offices, Newtown.

Morecambe.—Dwellings (187), Glen View Crescent; H. E. Shackleton, Heysham Hall, Heysham.

Neath.—Houses (42), Westernmoor estate; borough engineer; Gwyn Hall.

Norfolk.—Infants' school, Hellesdon; W. O. Bell, chief education officer, Stracey Road, Norwich.

Northampton.—Dwellings (108), Dallington Fields estate; borough architect.

Factory, Doddridge Street; Bassett-Lowke, Ltd., St. Andrew's Street.

Oakengates.—Permanent houses (44); N. M. Priestland, clerk to U.D.C., Council Chambers, Oakengates, Salop.

Plymouth.—Flats (93), Union Street; Louis de Soissons & Partners, architects, 11, The Crescent.

Torquay.—Houses (205), Marldon Road; borough engineer.

Tottenham.—Flats (100), Devon Road scheme; Rees J. Williams, borough surveyor, Town Hall, N.15.

Tynemouth.—Additions to the Victoria Jubilee Infirmary; Newcastle Hospital Board, Osborne Road, Newcastle-on-Tyne.

Block of flats (£500,000); borough engineer, 19, Howard Street, North Shields.

Wallingford.—Nurses' quarters at Fair Mile Hospital; Charles Smith & Son, architects, 164, Friar Street, Reading.

Quality in Lighting

GOOD lighting must not only be adequate in quantity, but it should also possess those qualities that make for ease of seeing, which were explained by Dr. J. W. T. Walsh (N.P.L.) in a lecture this week to the Association of Supervising Electrical Engineers.

Until recently the cost of providing a given amount of light was such that attention had to be concentrated on making the most of every lumen provided by every lamp. Now it was possible to design for quality as well as quantity.

The degree of diffusion to be aimed at depended on the work. For example, if it was necessary to be able to see inside a deep boring or to select papers from pigeon-holes, a high degree of diffusion or, what was the same thing, lightness of shadow was an advantage, whereas for sewing self-coloured materials it was a serious drawback and, in the extreme, might make such work quite impossible.

The colour of the light, again, was important in some cases and unimportant in others. Sometimes it was the general appearance of objects that should receive most attention and in such cases a reasonable degree of truth in colour-rendering was all that was needed, whereas for accurate colour matching a very close approximation to a defined spectral distribution was required.

Steadiness included not only lack of gross variations, but also absence of objectionable flicker. The intermittence of the light given by discharge lamps had sometimes to be borne in mind when designing an installation under certain conditions.

Freedom from objectionable shadows, as a requirement in good lighting, should not be confused with the degree of diffusion required. It was mainly a matter of correct positioning of the light sources in relation to the work and the worker, but naturally became more critical the less the light was diffused.

Finally, absence of glare, probably the most important factor of all, was by far the most difficult to achieve. Glare could be caused, not only by the presence of the light sources themselves in the visual field, but also by reflections of them in polished surfaces and even by excessive brightness contrasts in the neighbourhood of the area of attention.